VOL. XIV. PUBLISHED BI-MONTHLY. No. 66.

JOURNAL OF THE MILITARY SERVICE INSTITUTION

NOV. 1893.

WILLIAM L. HASKIN, Editor First Part.

Authors alone are responsible for opinions published in the Journal.

JAMES C. BUSH, Editor Second Part.

FIRST PART

I. ARMY ORGANIZATION — Colonel Sanger — 1145

II. FIELD WORKS IN MILITARY OPERATIONS — Lieut. Parmerter — 1182

III. A PROPER ARTILLERY FIELD ARMAMENT — Lieut. Birkhimer — 1208

IV. PROPER EQUIPMENT OF OFFICERS — Lieut. Brown — 1219

V. ORGANIZATION OF THE ARMIES OF EUROPE — Captain O'Connell — 1225

VI. COMMENT AND CRITICISM — 1247

I.—"Recruiting and Desertion"—(Anderson). II.—"Army Organization"—(King, Swayne, Dalton, Cutter, Rumbold, Dickinson). III.—"Is the Three Battalion Organization the best for us?"—(Edmunds). IV.—"History of the Second U. S. Artillery"—(Weaver).

SECOND PART

VII. REPRINTS AND TRANSLATIONS

1. Military Criticism and Modern Tactics — Author of "Campaign of Fredericksburg" — 1261

2. The Krnka-Hebler Tubular Bullets — 1272

3. The "Lining Plane" of the German Field Artillery — Captain Macbean, R.A. — 1280

4. Changes and Progress in Military Matters — Trans. by Lieut. Frost — 1281

5. Private Industry in Ordnance Manufacture in France — Trans. by Lieut. Sydenham — 1291

VIII. MILITARY NOTES — 1308

Artillery Reorganization in England. The Army Medical Staff. Patent Specification of a New Automatic Rifle. The Watkin Position Finder. Preserving Tools from Rust. Guns and Projectiles. Aluminum. Peace Effective of the German Army Under the New Law. A Collapsible Boat for Cavalry. Feeding of Horses. Infantry Exercises with Explosives. Field Artillery Fire.

IX. REVIEWS AND EXCHANGES — 1319

The Art of Subsisting Armies in War. General Greene. Continuous Current Dynamos and Motors. Duties of Outposts. Speeches and Addresses of William McKinley. Maynard's English Classic Series. Articles Accepted for the JOURNAL.

ANNOUNCEMENT INDEX HISTORICAL SKETCHES

X. THE SIXTEENTH REGIMENT OF INFANTRY — 1329

XI. THE TWENTIETH REGIMENT OF INFANTRY — 1334

75 cents a copy. Governor's Island, N. Y. H. $4 a year.

THE "FERRIS"
Delicious
Hams and Bacon.
A LITTLE HIGHER IN PRICE, BUT—!

Copyright, The Military Service Institution, 1893. Entered at N. Y P. O. as second-class matter.

XUM

XUM

Tiffany & Co.
Watch Department.

Gold Watches for Men.

Cuts Showing Sizes and Styles Sent upon Request.

Extra Flat Watches.
Open Face - $175 and $190
Hunting Case $180 and $200

Tiffany & Co.
Standard Watches
$190 and $200

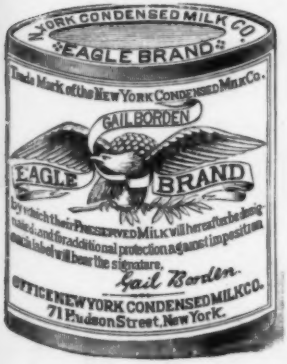
Bridge Watches.
Open Face - $95 and $115
Hunting Case $100 and $120

Grade B Watches.
Hunting Case or Open Face - - - - $65 and $75

Tiffany & Co.,

Union Square, New York.

GOING OUT CAMPING?


N.Y. CONDENSED MILK CO.
EAGLE BRAND
Trade Mark of the NEW YORK CONDENSED MILK Co.
GAIL BORDEN
EAGLE
BRAND
by which their PRESERVED MILK will hereafter be distinguished, and for additional protection against imposition each label will bear the signature,
Gail Borden
OFFICE NEW YORK CONDENSED MILK CO.
71 Hudson Street, New York.

Pic-nicking, fishing or hunting? If so, will not fail to appreciate the advantage of taking along a supply of the

GAIL BORDEN 'EAGLE' BRAND

Condensed Milk. It is most delicious in coffee, tea, chocolate and numerous summer drinks. For **30 years** the leading brand.

For tea, coffee and chocolate use undiluted. It's better than cream.

Good

morning

HAVE YOU
USED
PEARS' SOAP?

HORSTMANN BROTHERS & Co.

Established 1816.....

~MILITARY EQUIPMENTS~

PHILADELPHIA

Catalogues and Price Lists for all branches of the U. S. Service on application

Shannon, Miller & Crane,

NO. 768 BROADWAY, ONE DOOR BELOW 9TH ST.,

Formerly No. 46 Maiden Lane, New York.

MILITARY GOODS,

Equipments for Officers of the

Army, Navy, National Guards, G. A. R., etc.

Swords, Belts, Shoulder Straps, Caps, Embroidery, Etc.

Military, Naval & Civilian Tailors,

IMPORTERS AND PROVIDERS.

JACOB REED'S SONS,

916, 918, 920, 922 Chestnut St.,

Founded 1824
By JACOB REED. **PHILADELPHIA.**

F. J. HEIBERGER,

Army & Navy

MERCHANT TAILOR

OFFICERS' OUTFITTINGS,

535 FIFTEENTH STREET,

Opposite the U. S. Treasury. **WASHINGTON, D. C.**

ESTABLISHED 1851.

"PERFECT" WARM AIR FURNACE.

"PERFECT" WROUGHT IRON OVEN RANGE.

Heating Apparatus

. . and . . .

Cooking Ranges.

RICHARDSON & BOYNTON CO.

84 LAKE ST., CHICAGO. 222 & 224 WATER ST., NEW YORK.

127 SIXTH ST., PORTLAND, O. 97 UNION ST., BOSTON.

The U. S. Government has been purchasing goods of this Company for over twenty-five years. Furnaces and Ranges made by us are in universal use in all the posts and quarters.

CORRESPONDENCE SOLICITED.

XUM

INDEX TO ADVERTISEMENTS.

Arms and Ammunition.

Pratt & Whitney Co .... 10 back.
Union Metallic Cartridge Co.... 1326 (c).

Baking Powders.

Royal Baking Powder Co..... 4 cover.

Beers, Wines & Liquors, &c.

Bell of Nelson Distilling Co. ... 6 back.

Biscuits.

New York Biscuit Co..... 13 front.

Butter, &c.

Simpson, McIntire & Co..... 10 front.

Carpeting.

W. & J. Sloane..... 3 cover.

Cereals.

American Cereal Co..... 1326 (b)

Chocolates and Cocoa.

Baker, Walter & Co..... 1328 (b)
Maillard, Henry... ..... 1328 (a)

Chemists and Druggists.

Parke, Davis & Co..... ..... 1326 (d)
Scott & Bowne..... 1 back.

Cleaning Materials.

Estate of P. Hayden... ..... 8 back.

Clothing, Children's.

Best & Co..... ..... 3 back.

Clothing, Military and Civilian.

Hatfield & Sons..... ..... 11 front.
Heiberger, F. J .... 4 "
Henderson-Ames Co., The..... 6 back.
Reed's, Jacob, Sons..... . 4 front.

Dry Goods.

Arnold, Constable & Co.... . . 7 back.
Stern Brothers..... ..... 1 "

Engines—Hoisting.

Lidgerwood Manf'g Co.... ..... 8 front.
Mundy, J. S..... ..... 11 "

Envelopes.

Tension Envelope Co..... 10 back.

Food Products.

Bovril, Limited..... 1326 (a)
Cowdrey Co., E. T ..... 9 back.
Cudahy Pharmaceutical Co..... 1328 (a)
Dunbar's Sons, G. W..... ... 5 back.
Kemp, Day & Co ..... 5 "
Libby, McNeil & Libby..... 9 front.
Richardson & Robbins..... 14 "

Groceries and Provisions.

Ferris, F. A. & Co..... ..... 2 cover.

Hotels.

Hotel Delaware, Chicago..... 7 back.
Sturtevant House, New York.. 10 front.

Instruments, Civil Engineer and Surveying.

W. & L. E. Gurley..... 7 front.

Jewelry, Etc.

Tiffany & Co..... 1 front.

Lards.

Napheys, Geo. C. & Sons. ..... 7 back.

Milk, Condensed, Etc.

New York Cond. Milk Co..... 1 front.

Military Equipments.

Henderson-Ames Co., The..... 6 back
Horstmann Bros. & Co ..... 3 front.
Lilley Co., The M. C..... 11 "

Musical Instruments.

Wurlitzer Co., The Rudolph.... 11 back.

Mustard, &c.

Gulden, Charles..... ..... 8 back.

Painters' Supplies.

Aquila Rich Paint & Color Co.. 5 back.

Photographic Outfits.

Scovill & Adams Co ..... 12 front.

Pianos and Organs.

Chickering & Sons..... 16 front.
Knabe, William & Co. ..... 3 cover.
Shaw Piano Co..... ..... 15 front.

Publications.

Scientific American..... 3 back.

Scales.

Fairbanks Co., The..... ..... 12 front.

Ship Windlasses.

American Ship Windlass Co ... 16 front.

Shirts.

Keep Manuf'g Co..... 15 front.

Soaps.

Pears' .... 2 front.
Procter & Gamble Co..... .. 12 back.

Steam Heating.

Gorton & Lidgerwood Co..... 10 front.

Stocks, Bonds, &c.

Shoemaker, A. T..... ..... 9 front.

Stoves and Heaters.

Richardson & Boynton Co..... 5 front.

Tobacco.

Allen & Ginter..... 3 back.
Blackwell's Durham Tobacco... 4 "
Lorillard Co., P ..... 2 "

Typewriting Machines.

Hammond Typewriter Co..... 9 front.

Underwear.

Lewis Knitting Co..... 15 front.

Washing Materials (Starch).

Kingsford, T. & Son..... 14 front.

Water Filters.

Pasteur-Chamberland Filter Co. 9 back.

XUM

ESTABLISHED 1845.

W. & L. E. GURLEY, TROY, N. Y.

LARGEST MANUFACTURERS IN AMERICA OF

CIVIL ENGINEERS' AND SURVEYORS' INSTRUMENTS,

INCLUDING TRANSITS, Y-LEVELS, COMPASSES, PLANE TABLES, SOLAR COMPASSES, SOLAR TRANSITS, DIAL COMPASSES, HAND LEVELS, CURRENT METERS, ODOMETERS, LEVELING RODS, AND MEASURING CHAINS.

ALSO DEALERS IN ANEMOMETERS, BAROMETERS, STEEL AND METALLIC TAPE LINES, FIELD GLASSES, TELESCOPES, DRAWING INSTRUMENTS AND MATERIALS OF EVERY DESCRIPTION.

The engraving shows a modification of the simple Plane Table there being added a tangent movement in azimuth and three screws for leveling.

The board appears as cut away to show the socket and leveling screws and tangent movement by which, as will be seen, a more delicate adjustment in azimuth may be obtained.

This Plane Table complete costs $170.00.

Look for our Exhibit at the World's Columbian Exposition in the North Gallery of the Manufactures and Liberal Arts Building.

Our latest (January, 1893) Illustrated Price List mailed on application.

7

LIDGERWOOD MANUFACTURING CO.,

MANUFACTURERS OF

HOISTING ENGINES

—FOR—

Contractors, Pile Driving, Bridge and Dock Building, Excavating, Etc.

300 STYLES AND SIZES.

Over 9,500 in Use.

1893 Catalogue Now Ready.

96 LIBERTY STREET, NEW YORK.

197-203 Congress St., BOSTON.
34 & 36 West Monroe St., CHICAGO.
99 First Avenue, PITTSBURGH.
15 N. 7th St., PHILADELPHIA.
610 N. 4th St., ST. LOUIS.
40 N. First St., PORTLAND, ORE.

Sales Agents: { Fraser & Chalmers, Salt Lake City, Utah and Helena, Montana.
Hendrie & Bolthoff M'f'g Co., Denver.

Stocks, Bonds and Loans.

Investments made in safe and reliable securities, and first mortgage loans on improved real estate and industrial properties.

Parties with capital may find unequalled opportunity for investment by addressing,

A. T. SHOEMAKER,

115 Broadway,

NEW YORK.

LIBBY, MCNEILL & LIBBY,

(INCORPORATED)

Union Stock Yards, Chicago.

PACKERS AND PRESERVERS OF MEATS.

CANNED, COOKED, CORNED BEEF, SOUPS, OX-TONGUES, AND LUNCH TONGUES.

Oldest and best-known brand in the world. The goods stand unrivalled. "Semper idem," and are guaranteed in every particular.

READ THE FOLLOWING LIST OF TESTIMONIALS:

Silver Medal, American Institute, New York, 1876.
Bronze Medal, International Exhibition, Philadelphia, 1876.
Gold Medal, Germany, "Massive," 1877.
Gold Medal, Exposition Universelle Internationals de Paris, 1878.
Siver Medal, Austria, 1879.
Gold Medal, Royal Agricultural Society, London, Eng., 1879.
Gold Medal, Exposition des Sciences Appliquies a L'Industrie, 1879.
Both Gold and Silver Medals, The International Health Exhibition, London, England, 1884.

IDEAL KEYBOARD.

HAMMOND TYPEWRITER

Possesses the good points of other machines, and also many valuable features other Typewriters have not.

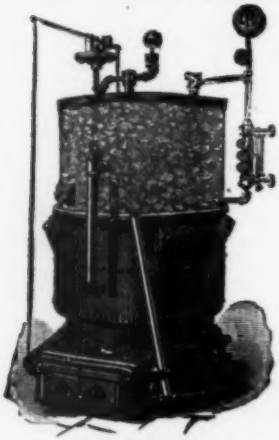
WHY NOT BUY THE BEST?

Send for Catalogue.

THE HAMMOND TYPEWRITER COMPANY,

240 Broadway,
447 and 449 East 52d Street,
NEW YORK CITY.

THE "GORTON" BOILER



FOR

Steam and Hot Water *HEATING.*

Economical in Fuel, Automatic, Self-Feeding.

A STEEL, SECTIONAL, TUBULAR BOILER.

CORRESPONDENCE SOLICITED

From Architects and those interested in Heating Large or Small Buildings.

SEND FOR GOVERNMENT REFERENCES.

GORTON & LIDGERWOOD CO.,

96 LIBERTY ST., NEW YORK.

34 & 36 W. Monroe St., Chicago. 197-203 Congress St., Boston.

STURTEVANT HOUSE

BROADWAY——28th and 29th Streets——NEW YORK.

HENRY J. BANG, Proprietor.

AMERICAN AND EUROPEAN PLANS.

Recognized Headquarters of Officers of the Army and Navy while on duty in or visiting New York.

CENTRALLY LOCATED, WITHIN EASY REACH OF RAILROAD STATIONS AND ALL THE PRINCIPAL PLACES OF AMUSEMENT.

SIMPSON'S TOP-O-CAN BRAND DIAMOND CREAMERY BUTTER

HIGHEST AWARDS.

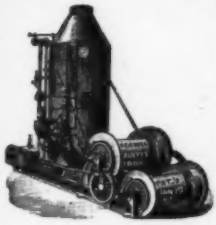
New York, -	1878	New Orleans,	1886
New York, -	1879	Boston, - -	1890
Melbourne, -	1880	Jamaica, - -	1891
Atlanta, - -	1881	Augusta, Ga.,	1891
New Orleans,	1885	Kimberley, S. Af.,	1892

Packed in 1, 2, 3, 5 and 7-lb. Tins.

SIMPSON, McINTIRE & CO., Propra.

Boston, Mass., U. S. A.

HOISTING ENGINES



Of any power and style, **Single and Double Cylinder**, with improved patent friction drums, especially adapted for all classes of work. Single and Double Drum, friction and direct geared, link motion **Mining** Engines. Four, Six and eight spool, lock clutch, self propelling **Bridge Erecting** Engines. Double cylinder, double friction drum **Dock Building** and **Pile Driving** Engines. Quick motion, friction geared **Coal Hoisting** Engines. Powerful compound geared, reverse link motion and friction geared **Quarry** Engines. With or without Boilers. Wire Rope Tramways, etc. Any amount of reference given. Established 1870.

J. S. MUNDY,

22 to 34 Prospect Street, NEWARK, N. J.

HATFIELD & SONS,

Tailors AND Importers.

Established 1833.

239 Fifth Ave., New York.

EQUIPMENTS FOR Officers of the Army.

MANUFACTURED BY

THE M. C. LILLEY CO., COLUMBUS, OHIO.

Army and Navy Scales.

No.	Capacity. Lbs.	Platform. In.	Price.
1324	500	17x22½	$40.00
1325	800	20x24½	45.00
1326	1,200	22x29	53.00

When not in use the Scale may be closed, as shown in cut, forming a strong and compact package, in which shape it can be easily and safely transported.

THE FAIRBANKS CO., 311 BROADWAY, NEW YORK.

PHOTOGRAPHIC CAMERAS

LENSES AND APPARATUS FOR ARMY AND NAVY.

This line of goods formerly furnished by

SCOVILL MANUFACTURING COMPANY,

(and now supplied by The Scovill & Adams Company, successors to the Photographic Department of Scovill Manufacturing Company), is extensively employed by the various Government Departments in fitting out Expeditions, Explorations, Geographical and Coast Surveys, etc., and preference is invariably given to the

CAMERAS OF THE AMERICAN OPTICAL COMPANY,

which are of superior design and workmanship. They make DETECTIVE CAMERAS, CONCEALED CAMERAS, LANDSCAPE CAMERAS, in varieties of styles, to which the Eastman Roll Holder is added when desired.

DRY PLATES of all the leading makes. "FLEXIBLE" FILMS, CHEMICALS, and Photographic Requisites of all kinds.

Send for specimen copy of THE PHOTOGRAPHIC TIMES.

Catalogues, estimates and information cheerfully supplied on application. Correspondence Solicited.

THE SCOVILL & ADAMS COMPANY,

Successors to Photographic Department of

SCOVILL MANUFACTURING COMPANY,

W. IRVING ADAMS, *Pres. and Treas.*
H. LITTLEJOHN, *Secretary.*

423 Broome St., New York.

XUM

HOLMES & COUTTS'

FAMOUS

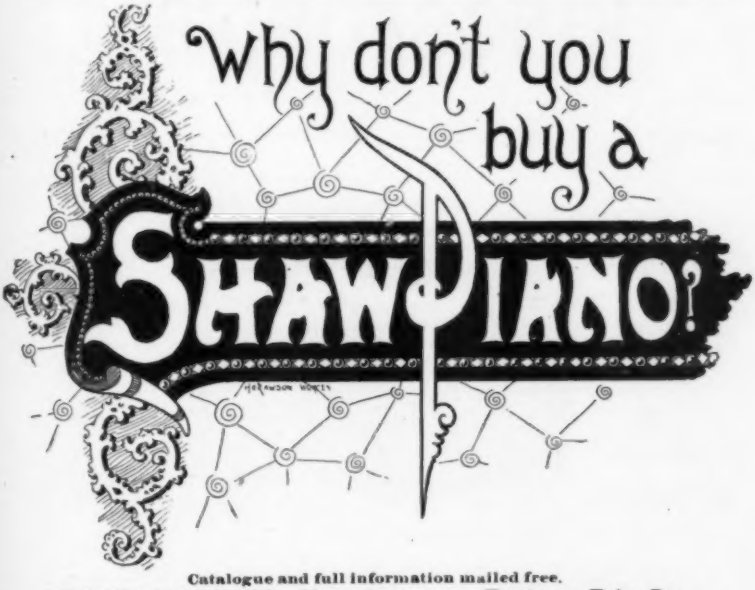
ENGLISH BISCUITS.

In one and two-pound tins are pronounced the finest in the World, and from their convenient style of package are particularly adapted for Army use.

MANUFACTURED ONLY BY

THE NEW YORK BISCUIT CO.

10th Avenue, 15th and 16th Sts., New York.



Catalogue and full information mailed free.

SHAW PIANO CO., Manufacturers, Factory, Erie, Pa.

XUM

POTTED MEATS, LUNCH MEATS, BONELESS HAMS,
ROLLED OX TONGUE, GAME, CURRIED FOWL,
BONED TURKEY, BONED CHICKEN,
TRUFFLED CHICKEN LIVERS, SOUPS, PLUM PUDDING,
EXTRA QUALITY PEACHES AND PEARS, &C.

☞No solder used **inside** the Can. **No acid** ever used in soldering the Cans.

We make no pretension to cheap prices but **guarantee quality of every Can.**

Sold by all first-class Grocers

RICHARDSON & ROBBINS, Dover, Delaware.

KINGSFORD'S

OSWEGO STARCH.

Sold
All Around
the
World.

"Silver Gloss"
and
"Pure"
FOR THE LAUNDRY.

The
"Original"
for
50 Years.

Kingsford's
Oswego
Corn Starch.
FOR THE TABLE.

STRONGEST. PUREST. BEST.

KEEP'S SHIRTS

Made to Order 6 for $9.00

NONE BETTER AT ANY PRICE.

These Dress Shirts have been in the United States Market for 25 years, and they are to-day worn by the best and wealthiest people, because of their superior fit, style, workmanship, and durability.

Our new Military Shirt with soft fronts is indispensable for comfort, and the correct setting of a military collar.

PERFECT FITTING GARMENTS ALWAYS GUARANTEED.

We are direct importers and manufacturers of

SMOKING JACKETS AND DRESSING GOWNS in the newest textures and designs.

EXQUISITE NECKWEAR embracing all the new shapes and colorings.

DRIVING GLOVES in the finest grades, and everything pertaining to

MEN'S FURNISHING GOODS.

CATALOGUES SENT FREE UPON APPLICATION.

114 Tremont St., Boston.
829 Chestnut St., Phila.

KEEP M'F'G COMPANY, 809-811 Broadway, New York.

FIT FOR COMFORT

And Comfortable Because They Fit

Comfort is as essential as appearance—and the beauty of our outer clothing depends much upon the symmetry and fit of the under garments. Well-dressed people wear tailor-made clothing, comfortably-dressed people wear Union Suits, insuring health, comfort and a good-fitting foundation upon which to build the tailor-made man or woman.

Comfort First All in one piece, easily adjusted, no wrinkling at the waist (as when the old-fashioned two garments are worn), warm and pleasant to the skin.

Economy Also Fitting perfectly, there is no understrain in any part. The Lewis Tension Yoke gives strength and Lewis Spliced Seat provides fullness when needed. There is no tearing—they last longer.

Lewis Union Suits Are tailor-made of the finest silk, wool and lisle and tailor-trimmed in all sizes and different weights for summer and winter. Ask your dealer to show them. Their use may be an experiment with you, but thousands wear no other. Our illustrated Catalogue may pave the way—we send it free.

LEWIS KNITTING COMPANY, Janesville, Wis.

1823. **CHICKERING PIANOS** 1893.

Played and Endorsed by the World's Most Eminent Musicians.

IMPERIAL CROSS LEGION OF HONOR.

HIGHEST RECOMPENSE EVER AWARDED.

83,000—Pianos Manufactured and Sold.—83,000

Seventy years' experience, an unquestioned reputation, and every facility for the best and most durable work.

CHICKERING & SONS,

791 Tremont St., Boston.

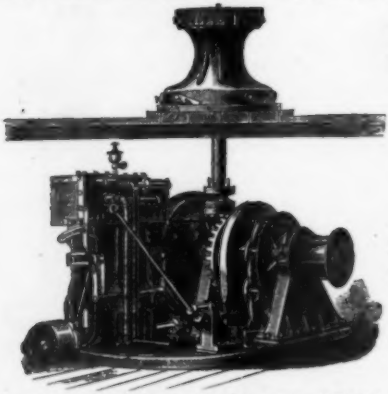
ESTABLISHED 1857.

AMERICAN SHIP WINDLASS CO.,

PROVIDENCE, R. I.

BUILDERS OF

WINDLASSES, HAND AND STEAM **CAPSTANS,**



Providence Steam Capstan Windlass. (Naval Type.)

Naval Windlasses,

Naval Capstans,

Worked either by Hand or Steam.

This Company is prepared to execute orders for ship machinery of all kinds, in either iron or steel, with promptness and despatch.

Send for Catalogue.

Address,

FRANK S. MANTON,

AGENT

JOURNAL
OF
THE MILITARY SERVICE INSTITUTION
OF THE
UNITED STATES.

"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

VOL. XIV. NOVEMBER, 1893. NO. LXVI.

THE ARMY ORGANIZATION, BEST ADAPTED TO A REPUBLICAN FORM OF GOVERNMENT, WHICH WILL INSURE AN EFFECTIVE FORCE.*

BY COLONEL W. CARY SANGER, ASS'T CHIEF OF ART'Y, N. G. S. N. Y.

AN eminent authority on the military, as well as the political conditions of Europe, has made the statement in discussing European politics, that "the present position of the European world is one in which sheer force holds a larger place than it has held in modern times since the fall of Napoleon."† The vast armies and powerful navies of Europe which are maintained at such enormous cost, are the inevitable consequence of this "Reign of Force," and prove the truth of Sir Charles Dilke's words; but his statement is only half the truth, for never in the history of the world has sheer force been so dependent on brain work to prepare it to strike its most effective blows; organization, discipline and the effective working of the administrative departments are as essential to success in modern warfare as the numerical strength of an army, or the ability of its generals. It was the work of years of organization and training, with the scientific study of all the problems of war, which enabled the Germans to pour men and officers over the frontier, in such numbers and in such condition, that the "sheer force" of

*This essay received honorable mention in the competition for the year 1892.

†"The Present Position of European Politics," by Sir Charles Dilke.

France, without proper organization or adequate training, spent itself in vain.

"The fate of the enormous levies raised from the French population in 1870–71, after the destruction of the regular armies, has convinced all who needed convincing, how more than futile is the attempt to meet "* discipline and organization with numbers. It is indeed a fact that "proper organization is more important than numbers."† It is no exaggeration to say that what defeated the French was the work done in organizing and training the German forces during the twenty years which preceded the war, and that the French were practically beaten before the first shot was fired.

Europe has learned this lesson and all the great nations of the world, except America, have not only greatly increased their armed strength, but have studied all military problems and questions, including that of the proper organization of their forces, with the utmost eagerness and thoroughness; but in this country, which has seen more advance in military science during the past twenty five years than in any preceding century, we have not perfected as we should the organization of our forces. With vast wealth and millions of able-bodied men, we have neglected those simple precautions which common sense, as well as military knowledge, point out as necessary; and as a result of this "policy of indifference," we not only have thousands of lives, millions of property, and our national honor at the mercy of a dozen possible enemies, but are without any carefully considered and deliberately matured plan of organization for the forces which we may, at any time, be compelled to call into active service.

Arguments may be advanced to prove to the satisfaction of many of our citizens that we should not keep a large standing army, or that we should not spend vast sums of money for forts and guns; but can a single American be found who will argue that what forces we have should not be well organized, or that we should retain a defective or imperfect organization?

To say that we should have some recognized and carefully thought-out system of military organization, and that all our available forces should have their proper places in this organization, each portion of the forces having its due relations to the other portions and to the force as a whole, would seem to be but

* "The Operations of War," by Lieut.-Gen. Sir Edward Bruce Hamley, p. 6.

† Report of the Major-General commanding the army, 1889.

stating truisms; but these fundamental principles have been ignored by us.

When war is declared there must be immediate action; the time for discussing theories is past.

A thousand and one things must be done, and every officer upon whom the responsibility devolves must know how they are to be done; there is no time to argue about which is the best way to do them.

Officers must be familiar with the terrain and must have accurate maps; they must be prepared to solve the daily problems of actual campaigning and fighting; the administrative departments must be in condition to do their work promptly and efficiently.

The different arms must be organized and trained so that they can do their allotted work; but, first and foremost, we must know where the soldiers are to come from, what companies, troops and regiments are needed in any given district; how the brigades and divisions are to be formed; how many army corps are needed, and what proportion of the different arms they must have. We know only too well that these fundamental matters have not been definitely settled. It is not enough that we have officers of high rank, or heads of important departments who have clearly defined views on this subject and who are competent to carry them into speedy execution. The plan which is to be followed out should be clearly and generally understood in advance, and the subordinates, upon whom much work would fall, should be intelligently informed of the details to which they will have to attend.

This lack of preparation is largely owing to the public indifference to military matters, which has done us so much harm and made it impossible to bring about the wished for changes.

Happily the people are beginning to recognize the importance, from a commercial as well as from a patriotic standpoint, of the questions which concern our national defense. The improvement in our navy, the beginnings of work for our coast defenses, and the satisfactory changes in the army which have lessened the desertions and raised the standard of the enlisted man, are most encouraging indications that further changes will be made possible.*

At the present time there is no more important subject for the people to consider in connection with military affairs, than the need of securing for the army the best possible organization. It is a question which is of quite as much importance to the

* Report of the Secretary of War, 1891.

people at large as to the army itself, and in this paper I have endeavored to present the subject in such a way that it would be of interest to the civilian as well as to the soldier.

The term "organization" is one of very wide signification, but for the purposes of the present discussion I understand it to mean the plan or system in accordance with which the component units of our armed force are to be constituted and arranged, and by which their functions and relations to each other and to the force as a whole, are to be determined.

The best organization is that which enables the force to do its work most successfully, with the lowest cost to the taxpayer and the least burden to the citizen. It is hardly necessary to say in this connection that all the vital questions of administration so absolutely essential to the successful conduct of any war, are closely connected with the question of organization; but it is not within the province of this paper to discuss in detail the subject of army administration, and it is sufficient to say in this connection that the changes which are proposed in this paper will greatly facilitate the introduction of improved methods of administration.

In order that any force may be well organized, the purpose for which the force exists and the work which it is to do must be clearly understood. The superiority of the German military organization—a superiority so marked that each nation of Europe has embodied some part of it in its own system—is due to the fact that the Germans clearly recognized the work which their army would have to do, and then developed the system which was best suited to keep their army in a condition to do its work, and which was at the same time in harmony with their national character and institutions. All changes which we may make should, in the same way, be the result of a clear understanding of what we expect our army to do, and an intelligent judgment that these changes will best secure the desired end.

The work which our army may have to do is well known. It may be called upon

1, to keep in order hostile tribes of Indians.

2, to quell domestic disturbances, and

3, to repel attacks from foreign powers.

As the army, notwithstanding its present defective organization, can do all that may be required of it under the first two heads, I shall pass at once to what it needs in order to resist successfully foreign attacks, with the statement that the changes

in organization, which I recommend, will facilitate the performance of any duty, under the first or second heads, to which the army may be ordered.

No one can deny that international complications which might lead to war, are always possible. The character of the attack, which in such a case would be made upon us, has often been described by military authorities; the danger which threatens us is an attack on our sea-coast, and the capture or ransom of one or more of our large cities. No nation will attempt the conquest of our territory. Our vulnerable point is our coast, dotted with rich and populous cities; these cities will be the first object of attack when we are involved in war with any foreign nation, and their capture or ransom would entail, not only a money loss, but worse than that,—a national humiliation unpleasant to consider. Naval attacks on our sea-coast would probably be accompanied by the landing of troops to coöperate on shore with the hostile fleet. "To gain a footing on an enemy's coast, and disembark a substantial body of troops there, is now one of the easiest operations of war, provided that the defenders have not a superior naval force, capable of crushing the invader's fleet which could cover the operation."

A hostile force might at the same time be thrown across the frontier in order to draw off some of our troops, or to capture or destroy places or property. It cannot be too strongly emphasized that our enemies will act on the admitted principles of modern war that attacks must be sudden, that the foe must be overwhelmed with force and numbers at the outset, and that the beaten side must pay the expenses of the contest; consequently our defense is not adequate unless we have a force so organized that it can successfully resist such attacks at short notice: a few months would probably be too long a time to count upon for preparation.

For the purpose of resisting such attacks our army is, by reason of its numerical weakness, impotent; it cannot supply the necessary artillery to garrison our forts, the submarine miners for our harbors or the engineers and infantry for defensive campaigns, not to speak of our complete inability to strike an offensive blow, without the power to do which no defense can be considered complete. Our people will never consent to keep a standing force sufficient to supply these needs; and, in fact, there is no reason why they should. What we need is an organization which will

XUM

enable us to put into the field in the shortest possible time a force sufficient for our needs, with all its component parts taking their proper places in, and making up a harmonious whole.

With our treasury overflowing and more than seven million able-bodied men liable to military duty, it would be easy to devise a system which would give us a force so strong as to be invincible, but any system, however good in theory, is practically useless if it is not such that the people will approve and adopt it. We must remember that practically we are restricted to the men who voluntarily agree to do military duty, our laws to the contrary notwithstanding, and that only a relatively small sum of money is likely to be appropriated for military purposes. The system which we must adopt then is one which, in spite of limitations of men and money, will supply in time of need the necessary number of men adequately trained.

In considering what is the best organization for our army, we must recognize as an evil which should be corrected, the fact that the army to-day suffers from lack of interest in it by the people at large; it is less understood by our citizens and there is less sympathy between it and the people than in monarchical England, republican France, or imperial Germany. There was a time when every country considered an army a menace to the liberties of the people and it is a curious fact that in America, where there is less real ground for such feeling against the army than in any country of the world, this prejudice and feeling of distrust is strongest.

This is largely due to the fact that the army stands apart from the people; its small numbers, and the relatively insignificant number of men who go back from the army to civil life, combine to make its members practically unknown to the citizens at large; the army is regarded as constituting a class or body of men distinct and apart from the ordinary citizens. This is most unfortunate and does both the army and the nation serious harm. It is of the utmost importance that this feeling should be overcome, and that complete sympathy and perfect understanding should exist between the army and the civilians, and that the civilians should feel a greater personal interest in the army. If the changes which I recommend will have a tendency to bring the army and the people into closer relations and to increase the popular interest in, and knowledge of, the army, while making its effective strength more proportionate to our needs, they should

for that reason have an especial interest for the civilian as well as the soldier.

I have attempted in what follows to outline a system which is thoroughly adapted to our republican form of government. I can make no claim to originality in regard to it; most of its features have been suggested at one time or another, and nothing is recommended which has not been successfully put into practical operation in one country or another. I have not hesitated to use extensive extracts from my own writings which have found their way into print, when they have been pertinent to the subject we are considering.

Recommendations, however perfect in theory, which for pecuniary or political reasons cannot command the approval of the people, may be interesting but cannot be useful, because popular opposition will make it impossible to carry them out; and in the following suggestions I have endeavored to confine myself to such changes as are simple and practical, and in harmony with those broad principles which should govern the organization of the army. I shall, so far as possible, avoid the discussion of all such matters of detail as might draw attention away from the more important questions which should first be decided. If the proper authorities are once agreed upon the fundamental principles of our military organization, the details of the application of these principles to our forces can be readily worked out. The changes which I would suggest concern:

1. The army, and
2. Those forces which I shall designate as the auxiliary forces.

THE ARMY.

The territorial or localization system should be adopted for the army, and the army should be given its own reserve by passing the enlisted man, after a short active service with the colors, into the Reserve for the balance of his term of enlistment.

TERRITORIAL SYSTEM.

As the territorial or localization system has been adopted in almost every country but our own, and as its principles are well understood, but few words are needed in regard to it. It consists in sub-dividing the large military districts, such as our present military departments, into smaller districts each of which has

its own military unit, either regiment, brigade or division, this unit being recruited from men living in its district. My suggestion would be to make this unit for the army a regiment, in which case these districts would be called Regimental Districts. It is plain that the principles of the organization of the forces within them will be the same whether the unit is a regiment, a brigade, or any other formation; I shall speak of them in this paper as Regimental Districts. Each district should have a number and also a name descriptive of the territory which it embraces.

The possible evils of the localization system have been pointed out by those who do not favor it. They have suggested the difficulty of equalizing the division of territory, and securing the proper quota from large cities and sparsely-populated country regions; the danger of the development of local rather than national feeling, and of the interference of politicians with a system which, by reason of its local character, comes within easier reach of their influence. I am certain that careful study of the question will convince any one that these objections will not prove to be serious obstacles to the successful carrying out of the proposed change. Our social and political conditions are so different from those countries of Europe which have adopted the system, that their unqualified approval of it is not conclusive for us. But the fact that this system has produced excellent practical results wherever it has been put into operation, is an argument of the greatest weight. Furthermore it is a fact of the utmost importance that this system is absolutely essential to the creation of a reserve which can be rapidly mobilized.

A reserve should be created for the army by providing that an enlisted man should only be in active service during a part of the term of his enlistment, after which he would pass into the Reserve for the balance of his time; during this time in the Reserve he would remain subject to orders to rejoin the colors at any time, but would be permitted to return to his home and be free to engage in any occupation; in return for his liability to be called out at any time, he should receive from the Government a small sum at regular intervals, say semi-annually.

These men should be required to report in person at certain designated places to receive this payment, and thus the real numerical strength of the Reserve and the situation of the men who compose it would always be known with comparative accuracy.

That a certain number of men in the Reserve might fail to re-

XUM

port when ordered out, or might attempt to draw their reserve pay by proxy while themselves away, is, of course, possible; but failure to report, say once a year unless absent by leave, or to be present when ordered out, should be treated and punished as desertion.

This system creates a reserve composed of men who have been trained in the army and by officers under whom they will have to serve. They do not form an independent or auxiliary force, but when called out they take their places at once in the army, of which they have been and still are a recognized part. This system increases the available strength of the army and it makes that strength available in the shortest possible time, and it also enables the country to train more men for any given sum of money, for it must be remembered that the longer the service the fewer men can be trained for the same cost.

In recommending a short time of active service, I would not be understood as maintaining that two or three years' training will accomplish as much as a longer service; but our military system cannot be ideal, it must be what a writer on the same subject in another country has called a "practical approximation to the ideal."

The "beneficent and wise legislation of Congress" by which enlisted men are permitted "under certain conditions to purchase their release from service or to claim an honorable discharge after serving three years" is a step in the direction which I have indicated, and the excellent results of this change gives promise of the successful application to our army of the principle for which I am contending.

Taking into consideration our military needs, our political and social conditions, and the present relation of our army to the people, I do not hesitate to say that the army and the nation will benefit if after a short time of active service the enlisted man passes into the Reserve. As the country will not maintain a large force under arms, we must avail ourselves of the best system for increasing the available strength of the army at a small cost, and as short service followed by a time in the Reserve accomplishes this, we are justified in limiting the length of active service to the time requisite to turn out an efficient soldier.

Some of the German military authorities say that a perfect infantry soldier for offence can be formed in two years and for defense in one, but I do not feel called upon to argue in favor

of any specified time, as my contention is for the principle of a short service with the colors, followed by a period in the Reserve, leaving to the proper authorities and for discussion at some other time, the determination of how long that service should be.

Short service entails extra work upon the officers, and more attention must be given to an officer's capacity to turn out good soldiers, but the benefits of the system more than compensate for any disadvantage it may have.

Among the advantages of the system of short service is the fact that it increases the size of the army, although only a small number of men are under arms at any one time, and it does this in the most economic manner possible. If, for example, we have 25,000 enlisted men, and have them serve two and one-half years with the colors and then pass into the Reserve for the same length of time, we should have 25,000 men always with the colors, and 25,000 additional always in the Reserve. These additional men, if paid $12 per man per annum, would cost the country $300,000 yearly, or if paid $24 per man, $600,000, and taking the pay of the army at $12,500,000 we would practically double the size of our army, or at least double its available strength, by increasing our expenditure only from 3 to 6 per cent. This does not include any estimate of the expenses of uniforms, arms, etc. If the time of active service were reduced to two years, with four years in the Reserve, we should have 25,000 men with the colors, and 50,000 in the Reserve, thus increasing the available strength of the army 200 per cent. by an increased cash expenditure of from 5 to 10 per cent.

If the number of enlisted men be increased to 30,000, in accordance with the recommendations so often made to Congress by our highest military authorities, and these men serve three years with the colors and are for two years in the Reserve, or serve two and one-half years with the colors and are for two and one-half years in the Reserve, we have an available force of 50,000 or 60,000 men for a relatively small additional expenditure of money.

The figures which I have given are but illustrations of what can be done under this system. The amount paid the Reserves and the length of active service and time in the Reserve, being the factors which determine the expense.

I do not think that the "money argument" should be given

more than its due importance, but the difficulty of getting suitable appropriations from Congress gives interest to the question of getting as much as possible from the expenditure of any given sum of money, an interest which is not diminished by the fact that our army is, relatively to numbers, the most costly in the world.

Another great advantage of this system of organization is that it trains a large number of men, thus increasing the proportion of our citizens who have had the experience of army service, and who are consequently competent to render the country some service in time of need. For example, if the active service were two and one-half years, and the army 30,000 strong, 60,000 men would be trained every five years as against 30,000 under the present system.

Our army is limited in size by the will of the people, and we are apt to feel that our military power is therefore seriously weakened; but the system to which I have referred offers a way, with relatively trifling expense, of greatly increasing our available strength, and of infusing into the people a large proportion of well-trained serviceable men who would be of the greatest value in an emergency.*

The greater the number of good men who go back to civil life after a short and satisfactory experience in the army, the closer the relations become between the army and the people: it would be well if we could greatly increase the number of men who would enlist with the idea that their military service was but an incident in their lives. The former Secretary of War said, in speaking of the age limit for enlistments and reënlistments, "It is better that the soldier's service should be an incident and not the business of his life." It would be of advantage to the army and to the people at large if this were the generally adopted idea of an army enlistment. Young men should be brought to look upon service in the army as the performance of a duty to which every citizen is liable, but which if voluntarily assumed is an

* It is not without interest to note that this system of short service and reserves was the result of Napoleon's effort to weaken Prussia after the peace of Tilsit, by limiting her army to 42,000. Gen. Scharnhorst, King Frederick William III.'s Minister of War, whose genius has left a lasting impress upon the Prussian army, adopted the principle of short service, passing the men into the Reserve and continually taking new men, so that in a few years the nation had many thousand trained men, who were able at Leipsic to avenge Jena, and prove the value of the system which has now become almost universal.

honorable act; the service should be made attractive and the physical advantages of the training should be clearly understood; and it should be felt by young men and parents, that the army service is both creditable and beneficial. We have been the most backward nation of the world in raising the standard of the enlisted man, and this is largely due to our antiquated organization. I believe that a short active service followed by liability to duty in the Reserve will be of great service in bringing the army into its proper relation with the people.

The first principle of modern war demands that we should be prepared to resist sudden attacks, and no one has yet devised a system which makes possible the massing of large bodies of reserves as quickly as the territorial or localization scheme.

The territorial system develops and stimulates a local interest in the regiment; this interest is a most important factor in bringing the army into closer relations with the people and consequently in raising the class of recruits, a direction in which, although recent changes have done much, much still remains to be dône. More important, however, than any other consideration is the fact that this system is absolutely necessary to the creation of a reserve which can be rapidly mobilized.

We have become accustomed to regard a Reserve as a force which is independent of our army, and which is to be organized after hostilities have been threatened or the army has entered upon the first active duties of the campaign. Whatever we may do in the direction of organizing such a force, we should also give our army, what all the principles of modern military science demand that it should have, viz.: its own Reserve. In time of peace the men with the colors would not form more than one battalion, but when the Reserve were called out, a second, or even a third battalion, would be at once filled up.

There should always be a sufficient number of officers to supply the first and second battalions, and it would be well to have enough officers "on detached service, prolonged leaves of absence, etc., who would in the event of war be immediately recalled to the colors, organize a third battalion and take the field." The importance to the nation of having thoroughly trained officers for its soldiers is too often ignored, and cannot be too earnestly insisted upon. War has become a science in which the valor of the soldiers is only valuable as a supplement to the talent and ability of their leaders, and good officers are now absolutely

necessary to an army's efficiency, and no part of a nation's defense is more important than a body of well-trained officers.

The territorial system should be applied to the infantry, artillery and engineers, although the district need not be the same for the various arms. It might also be applied to the cavalry; but the difficulty is so great of getting at short notice the proper number of trained horses for the Reserve, that the drift of the best authorities is in the direction of keeping cavalry at nearly its war-strength in time of peace. If we adopt this principle, or if we find it inadvisable to keep a Reserve in this arm, one reason for its localization is taken away; but the other reasons are, in my judgment, sufficient to make it advisable to apply the system to this arm of the service.

Under the territorial system the men ordinarily serve in the vicinity of their homes, though they are, of course, liable to be sent away. The nearness of their homes, combined with short service* and the possibility of getting a discharge by a fair payment, would attract to the army, not only many more men than are now willing to enlist, but would ensure the enlistment of a class of men who are not now willing to enter the service.

It has been forcibly said by the late Secretary of War, in considering how desertions could be lessened, enlistments increased and the standard of the enlisted man raised, that "the pith of the whole question is to make the service worth seeking, and then enough good men will seek it and be glad to stay in it." The foregoing system of organization would, it is submitted, tend to make the service more attractive and better "worth seeking."

One of the greatest merits of the territorial system is, that it makes it easier to escape from the excessive centralization which mars our present military organization.

The English and ourselves have both retained the centralized system, a bad feature which modern theory and practice alike condemn. The evils of excessive centralization have been so clearly and forcibly pointed out, that it is unnecessary to repeat what has been said. Certain defects in the system were clearly shown in the Franco-Prussian War. France had a centralized military organization not unlike our own, and it broke down completely under the pressure to which it was subjected. Their corps,

* The effect of short service upon recruiting was shown by the fact that England could not keep her "Guards" at their full authorized strength with a six years' service, but was able to do so when the term was reduced to three years.

XUM

division, and even regimental commanders, were obliged to apply to the authorities in Paris for everything which the force needed to fit it to take the field. The French authorities in Paris were distracted by the demands for arms, by questions concerning transportation, where recruits should be sent, how men in one part of France could be got to their regiments in another. In Germany the organization and preparation were complete in each district. Every man knew where his regimental headquarters were, the Reserves were all near at hand, and the regiments were quickly and easily brought up to their war strength by the officers in charge of the military districts.

The German military authorities at Berlin were thus freed from the need of supervising all petty details and were at liberty to consider how the campaign could be best begun and carried out; they naturally profited by this condition of affairs. Their official account of the war tells that the first orders issued from Berlin were that the army should concentrate on the frontier, but the fact that the French were found to be massing their troops on the same line, led to the conclusion that this must be the result of an organized plan for invasion which it would be safer to resist with the Rhine as a base, and in consequence the first order was changed; but when it was discovered that the French troops were in the confusion which characterized what might be called their organization on the field of battle, the order was again changed and the German troops were sent to the frontier, with the result so well known. If the lesson of that contest is learned, actual warfare will never again present so clearly the contrast between a force like that of France,—dependent on a centralized system, not only forced to wait for the time of danger to complete its organization but obliged during the consequent confusion to apply to a central authority for men and supplies,—and an army like Germany's with a decentralized organization, complete preparation in each locality, and leaders free to make their plans for defeating the enemy instead of being forced to exhaust their energies in getting their own men ready to fight.

We should profit by that lesson, and should avail ourselves of the territorial system, because, among its many merits, it will make it easy to correct some of the evils of our present centralization.

We should have in each district a completeness of organization and a more or less thorough preparation for war, for which

the officer commanding the district should be held responsible. He should be required to see that the administrative departments within his district were efficient, and that the necessary stores, supplies and material were on hand; the central authorities would thus be in a position to consider the great questions of any war or campaign, without being burdened with the minute details of all the work of the administrative departments in the different parts of the country.

A consideration of the best plan of organization for the army would naturally include a discussion of the number of men necessary for the peace establishment and the disposition of these men among the various companies, troops and batteries; but the report of the Major-General commanding the army to the Secretary of War, under date of October, 1890, has treated this entire question in such way as to make further discussion or amplification unnecessary. It cannot be denied that the imperative needs of the service and of the country demand that the enlisted strength of the army should in time of peace be 30,000; and these men should be distributed in accordance with the plan set forth in that report.

On one other matter of organization it is sufficient to quote from General Schofield's report of 1891. "The conditions of Modern Tactics require the three battalion organization for the infantry, as well as for the cavalry and artillery, each battalion to consist of not more than four companies, troops or batteries. * * * The artillery organization ought to be made to conform to that in the other arms of the service, namely, with one captain and two lieutenants."*

I have not thought it necessary to discuss the question of forming what has been called an apprentice battalion; the arguments in its favor which are in my judgment conclusive, are set forth in the report of the Inspector-General under date of October, 1890; such a battalion is provided for in the plan for the distribution of the enlisted men to which I have just referred.

I have not discussed the questions of the retirement of officers, promotion from the ranks, the pay of non-commissioned officers, the enlistment of Indians, and desertion. I recognize their im-

* It has not seemed necessary to cite further authorities on a point about which there is practically no difference of opinion. As the former Secretary of War expressed it, "Persia, China and the United States are almost alone in adhering to the single battalion system."

XUM

portance; but the reports which have been submitted to the President within the past few years from the War Department, contain all that need be said on these subjects. Nor have I taken up in detail the internal organization of brigades, divisions and army corps; I have endeavored, as I stated at the outset, to limit myself to broad fundamental principles of organization, leaving the many questions of detail to be determined after a consensus of military and popular opinion upon the groundwork of our military organization.

AUXILIARY FORCES.

In the preceding suggestions I have pointed out what I believe to be the principles upon which we should organize the army; but no discussion of army organization would be complete which ignored those forces which would be used to supplement the army if we were involved in a war of any magnitude.

If more men were needed than the Government would be willing to incorporate in the regular army, we should either use the existing State forces, or create a new force similar to the volunteers in our last war; probably we should do both.

When we have decided upon the best organization for the army, there still remains the vital question,—what is the best organization for these other elements of our armed strength, which would be used to supplement or coöperate with the army. These forces I shall designate as the auxiliary forces, and I shall speak first of the existing State forces, known as Militia or National Guards.

No question is more difficult of a satisfactory and practical answer than how these State forces can be made an effective reserve or auxiliary for the army. Able writers have discussed this question often and exhaustively, but there has been a wide difference of opinion in regard to what changes should be made in their organization. This is largely due to the fact, which we should recognize at the start, that what is best in theory in regard to this force, is not possible in practice. Another fact which must not be lost sight of is that no material change can be forced upon the existing State forces; the members of these forces must first be convinced of the wisdom and need of any change. While there are so many conflicting theories regarding this subject, it is hardly to be expected that the members of these forces throughout the country will reach an agreement; until they do, the

changes are not likely to be carried out. I am inclined to think that the first and most important step is for military authorities to agree upon some complete plan of organization, in which the National Guard has its designated place, and after the members of the force have had an opportunity to study the proposed plan, and have learned that their present local organization will not be interfered with, and that they will merely have a wider field for usefulness and importance, they will themselves advocate and bring about the desired changes. The status of these forces under the law has been discussed. Lieutenant Batchelor voices one opinion when he says: "They not only exist without warrant of Federal law, but in direct contravention to the Constitution."* While many hold this opinion, others would deny the accuracy of the statement, but all would agree with him when he says: "There is no doubt however of their value, no fear of their improper use." Whatever may be said about the legality of their organization, it is a fact that they have the recognition and support of the people and that they have no inconsiderable influence in politics, although this influence has never been used for any purpose but to promote the interests of the force, and they are so strongly rooted in our State systems that it would be useless to argue about their constitutionality; our wisest plan is to try to make their usefulness to the nation as great as possible. At the risk of repeating what is only too well known, I shall call attention to some of the defects in the present organization of the militia.

It is in no sense a reserve, it is hardly an auxiliary force in the proper sense of the word; there are forty independent forces, which are organized and constituted without any regard to their relation to each other or to our military forces as a whole, entirely without regard to national needs and without any idea of coöperation with the army. It is impossible that a force thus organized can have the cohesion necessary to a successful fighting force. Nor can it be expected that such a force would have anything like a proper proportion of the various arms.

In many of the States the militia, as at present organized, is thoroughly competent to supplement the police and preserve order in the State, as has been recently shown at Homestead in Pennsylvania and Buffalo in New York, and undoubtedly some

*"A United States Army," by Lieut. Batchelor, JOURNAL OF THE MIL. SERV. INST., January, 1892.

four or five States have forces which have attained a most commendable degree of proficiency in those matters in which they have been trained. Many regiments of infantry are capable, with a little practical training, of doing most important and valuable work; but the militia taken collectively is not capable of taking the field as a fighting force. Not only is it without sufficient cavalry or field artillery, but it has no transport service, and with some notable exceptions, no medical service or properly trained staff. There is no plan or system in accordance with which the forces of the various States would take their proper places as parts of an operating army, or troops from different States be brigaded or assigned to divisions or army corps, or by which general officers would get commands. Nor has any plan or system been adopted of employing them collectively with the army. Nor is the militia organized as a complete unit in each State to resist the danger to which its State is most exposed, or even to aid the army in this work. If we were involved in a war, our first and greatest, one might say our only danger, would be from attacks upon our important sea-coast cities, such as New York, San Francisco, Boston, etc. Our artillery would be utterly powerless, by reason of its numerical weakness, to garrison the few forts which we possess, or serve the few guns now in them. Take, for example, the forts in New York Harbor. There are at present serviceable smooth-bores and converted and other rifles, mounted or in position to be mounted, in the New York Harbor forts, which would require for a single day's action, with three reliefs, over 7000 men. The fortifications board, assembled by the President under Act of Congress approved March 3, 1885, stated that the proper defense of New York Harbor calls for 239 additional rifled guns and mortars; these guns would require at least 6000 additional men; if the recommendation of the board were fully carried into effect we would require at the lowest estimate 13,000 artillerymen for New York Harbor and 85,000 for all our forts; but considering for the moment the conditions as they now exist, we find that New York alone with its present insufficient armament needs over 7000 artillerymen for one day's action. We have at present 3600 artillerymen,* and if every artilleryman in the army was sent to New York Harbor, there would be over 3000 men too few

* The return of the actual strength of the army in June, 1891, gives the total in the artillery at 3665.

to serve the present insufficient number of guns in one day's action. One might suppose that the New York militia would be the force to supply the needed men, but out of the 13,000 men who now compose that force, there is not one company trained to serve heavy sea-coast guns or guns of position. There are three light batteries armed with Gatling guns and 12-pounders, and one of the infantry regiments spent a week in one of the harbor forts eight years ago; but with these exceptions the force has never seen a mounted gun when on duty.

As the value of artillery depends largely on the skill of the men at the guns, and as men are almost useless without training, it is made sufficiently plain, I think, without additional illustrations, that the best of our State militia is liable under State control to be utterly unable to render that aid to the army and to the country which may some day be sorely needed. This aid, I believe, it is the duty of the militia to be able to render. That this force, under the Constitution, exists for national as well as local purposes, hardly seems to admit of doubt. The Constitution says: "Section 8. The Congress shall have power to provide for calling forth the militia to execute the laws of the Union, suppress insurrections and repel invasions, to provide for organizing, arming and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the States respectively, the appointment of the officers and the authority of training the militia according to the discipline prescribed by Congress." And "the President shall be Commander-in-Chief of the militia of the several States when called into actual service of the United States."

It is thus made plain that the militia is a force which, in time of need, can be called into active service for the nation; and furthermore our military authorities count upon it for our national defense. The Major-General commanding the army, in his report of 1890, says, "The artillery force alone to be drawn from the militia will be sixteen times as great as the regular artillery force which it is proposed to maintain in time of peace." And it follows as an inevitable result of this fact that in the organization of our armed forces the existing militia or National Guard formations should be given their proper places.

While I believe that a closer union of all the armed forces of the nation under one harmonious organization should be the goal for which we should strive, I do not think that this result can be

XUM

attained for a long time, and for the present we should attempt very little in this direction.

In discussing the best organization of our army, there are three ways in which we may regard its relations to the militia:

1. We may strive to increase the effective strength of the army, so as to make it independent of the militia.

2. We may regard the militia as an auxiliary to, but not part of the army, and leave its organization, as at present, entirely to the various State authorities.

3. We may give the militia its proper place in a carefully considered plan for the organization of all our armed forces.

In regard to the first plan, the suggestions which I have made regarding the organization of the army, provide the best possible way for increasing the effective strength of the army, and I should favor the development of the army in this direction, as far as Congress will permit.

In regard to the second point the energy shown in many States in increasing the efficiency of their National Guards, must be regarded with the sincerest satisfaction by all, and every possible encouragement should be given to the members of these forces who are, often at much personal sacrifice, accomplishing such satisfactory results.

The Secretary of War in 1890, in his report for that year, said: "Being impressed with the importance of an effective militia as a prominent and necessary factor in any military organization suited to our country, the Department has endeavored by its coöperation to encourage and aid the National Guard so far as possible under existing law."

This attitude on the part of the Government is of great value to the National Guard, and has been productive of excellent practical results, and it is to be hoped that every effort will be made by the national government to increase the efficiency of this force.

Of these three plans there is no doubt that the third is not only the best in theory, but is in perfect harmony with the spirit and letter of the Constitution and the law. I have heretofore expressed my views, at some length, on this subject: while I have not changed my opinion as to the advantages which would result to these forces and to the army from a closer union,* I am

* "It should be understood that bringing the militia into closer relations with the army, in the proper sense of the phrase, only means that the sphere of usefulness of

satisfied that all efforts to effect any material change in the organization of these forces will meet with great difficulties; and I therefore think that at present it would be unwise to attempt more than very slight changes in this direction. My suggestions would be that when the army organization is decided upon, the militia regiments should be given their proper places in the new system; their present local character and internal organization should not be interfered with, and in time of peace their work and duties should be left practically as at present. Instead of being parts of forty odd heterogeneous systems, they thus become component parts of a homogeneous force in accordance with a carefully considered and deliberately chosen plan of organization. This would be the first step in the direction of bringing the militia into close and satisfactory relations with the army, and the future alone can determine how close this connection can eventually be made.

In carrying out these suggestions I would recommend that the military districts adopted for the army should each consist of one or more States; when the district embraced more than one State, each State should form a recognized sub-division of the district. All the forces in a district, regulars and auxiliaries, should be organized in brigades. The militia regiments in each State should have their designated places in these brigades, which should contain the proper proportions of the various arms; the brigades should be united in divisions, and the divisions in army corps. When the forces in any State were sufficient to form a division they should be so combined, and when insufficient, brigades from different States should be united for that purpose. The regular regiments should have their places in the brigades. In all these formations the present character of the militia regiment should not be in the slightest degree changed or affected.

Army officers should be assigned to the command of the brigades, the divisions and the army corps, but the authority of such officers over the militia, in time of peace, would be merely nominal; they would not assume command of the militia except

---

the militia will be widened; that it will be given a more important and responsible position as a part of our armed force; that it will have a chance to learn many things more useful and interesting than the dry routine of armory work, and at the same time that its present regimental organization will not be changed, and the amount of work will not be increased."

when it was ordered out by the President; the national government would, however, have the right of inspection, but apart from any question of right, the States would undoubtedly welcome the presence of an army officer for this purpose; the officers detailed for this duty could arrange to make their inspections at the time of the State inspections, and thus no additional duty would be imposed on the State forces.

Such a system as I have outlined would accomplish two desirable results; it would, in the first place, give every military formation in the country its proper place in a carefully considered and comprehensive military system, and the Government would be constantly informed of the condition and efficiency of all the various forces, over which it could, in time of need, exercise control; and secondly, it would establish a connection, however slight, between the militia and the army, a connection which I cannot but feel would grow closer and closer, and would be of great value to both forces. Furthermore, the Government would be enabled to insure having a proper proportion of the various arms in each district; it could not, of course, order an infantry regiment to become a regiment of artillery, but it could determine how many infantry regiments it needed in a given district, and it need not include in its system of organization regiments which it did not require. If it were found that any needed arm of the service was not sufficiently popular to attract recruits, the government, by extra allowance to members or to the organization, could easily secure the necessary number of recruits.

The national government should unquestionably arm the militia and supply it with a proper amount of ammunition for target practice. Apart from the proper and legitimate saving to the several States, uniformity of arms to be used by soldiers when ordered out by the government may be said to be a military necessity. At present the musket used by the army is different from those used by some of the States; for example, the New York militia are armed with the 50-calibre musket, while the army musket is 45; so that the national government has not a cartridge which the National Guard of New York could fire from their muskets. The Ordnance Department would have to procure and keep a separate supply for these troops, and there would always be the danger that they might find themselves in action with cartridges which would not fit their muskets. A distinguished

English ordnance officer in Barrington's "Problem of Invasion," has said "It is impossible to conceive the inconvenience and possibly the disaster, that might result from the fact that the regulars and auxiliaries carry rifles and carbines requiring different kinds of ammunition."

Under this system every effort should be made to carry out General Schofield's recommendation that the militia should "be relied upon largely for the sea-coast artillery reserve," an arm of the service which is now almost entirely ignored in the National Guard. In his last report, to which I have referred above, he suggests that "steps be taken without delay to organize in all of the sea-board States a due proportion of heavy artillery batteries for the service of the fortifications in those States, and that these batteries be reported to the War Department in order that their places of instruction may be assigned to them where they can spend the period of their annual encampment for such purpose in company with the regular troops and under the immediate instruction of accomplished artillery officers." The importance of this recommendation cannot be overestimated; but pressing as is the need of carrying it into immediate effect, I am led by what I know of the militia, to fear that it will be long before they organize anything like the necessary number of batteries. Every encouragement should be given them to do this and, when organized, it will be for the interest of the National Guard as well as of the army to have the relations between these batteries and the regular artillery as close as possible. It would be well, as I have said before, to give each formation its designated place in the artillery organization of the country. But we must recognize how serious are the obstacles and difficulties in the way of inducing the State forces to make changes in their organization even when, as in the case we are considering, it is absolutely essential to the full usefulness of the National Guard for the national defense. It is no disparagement to the militia to say that the social pleasures which are secured by joining a regiment which has a handsome armory with attractive company rooms, are potent factors in securing recruits. The company rooms take the place of a club with the members of many regiments, and the entertainments which are given in the armories range from theatricals and concerts to large dancing parties. I think it is safe to say that but few men join the militia simply for the purpose of doing military work; consequently when the

important duty of learning to serve guns of position in the harbor forts, without those attractions which an armory affords, is contrasted with the work of the infantry, which is with rare exceptions performed amid pleasant surroundings where interested friends can be present, the recruit decides that he does not wish to be an artilleryman. These facts do not prevent the States from developing many efficient regiments, capable, with a little training, of rendering most valuable service; but they do have a very direct bearing on the question of the organization of batteries of heavy artillery. The difficulties and delays which will impede the accomplishment of the changes necessary to increase the efficiency of the existing National Guard, especially in the matter of coast defense, suggests a question which is, in my judgment, entitled to the most careful consideration. Ought we not in our military organization to provide for another force? During our last war we organized the volunteers; would we do this again if we were involved in a foreign war of any magnitude? If we should have to do so, it is an imperative duty to give such a force its proper place in our military system before actual hostilities are imminent.

With so many State forces in existence, many persons will object to the creation of a new force; but if it is admitted that such a force must come into existence in time of war, we should recognize the fact, and at least give it a place in our military system. My own feeling is that there is no reason why we should not experimentally create the nucleus of such a force on a plan similar to that followed in England with their Militia. In England the auxiliary forces consist of the Volunteers, the Yeomanry and the Militia; the Volunteers correspond to our existing Militia or National Guard; the Yeomanry are volunteer cavalry, and the Militia are organized on the plan which I have indicated in what follows concerning the suggested new force. I refer to this English force because England is, like America, without compulsory military service, and largely dependent on the auxiliary forces to supplement the relatively small army; the admitted success of incorporating such a force in the military system of a commercial country with habits and customs not unlike our own has led me to make the following suggestions:

The military duties of this new force should be performed during a continuous period of three weeks or a month, the men being entirely free all the rest of the year, and of course at liberty

to engage in any occupation they might select. The enlistment should include a period of active service during which the men would each year do the specified amount of work, and a period in the Reserve, during which they would be liable to be called upon if needed for active service.

Under the term enlistment, a man would be liable to be called out at any time when his services were needed for insurrection, threatened invasion, etc.

The largest unit should be a battalion, and in most instances the formations should be companies or batteries, and the highest rank should be lieutenant-colonel. These batteries, companies and battalions should be linked to and form part of the regiment in their district. Although organized as separate battalions, companies or batteries, the men, when called out for their training or in case of emergency, should be liable to do duty either in the army battalion or their own; that is to say, they could be trained, drilled and fought in their own battalions or companies, or the men could be incorporated individually or by companies in the army battalion; when the army formation was sufficiently strong, the individuality of the formations of these auxiliary forces would be maintained, but when needed its members could be used to strengthen the army battalion in any way that circumstances demanded.

The plan which I have suggested would necessitate having the personnel of this force more like that of the army than that of the militia.

There are many workingmen in the country and the city whose occupations are such that, owing to periods of enforced idleness or slackness in their work, they can easily get off for from one to four weeks at certain times of the year. To these men the pay and perquisites, combined with a month in uniform at some pleasant place, would be sufficient inducement to enlist.

In a note I have given a list of employments of the men in a military company in England.* This regiment comes from a

* In the *Nineteenth Century* for April, 1887, Lord Wolmer describes a militia regiment. The occupations of the men in one of the companies were as follows:

Farm laborers, including carters' boys, cow boys, under shepherds, etc.	39
Laborers, including dock-yard laborers, bricklayers laborers, porters, unskilled merchant seamen, etc.	34
Painters	3
Shipwrights	3
Gardeners	

country district, but there are many city regiments formed from a corresponding class of men; and England has found it possible to maintain a force similar to the one I have described, and 150,000 strong, composed of men from both city and country, who are able and willing to do one month's uninterrupted service. We have many men who would make excellent soldiers, who could give the time necessary for the annual training of this force.

There should be a rigid scrutiny regarding the facts of the recruit's residence and his reputation for honesty, sobriety and faithful work. This would entail extra work on the recruiting officers, but this work would be well repaid if it resulted in having a force composed of steady, reliable men; and if this force is to form the nucleus of a "citizen army" in time of a great war, it is of the utmost importance that it should stand well in the estimation of the people, and should be recognized as composed of men of good character.

The creation of such a force seems to be justified if not demanded by our action during the last war. The nation did not use to any extent the existing State organizations, nor was the army increased sufficiently to do the fighting; the various States were called upon to supply new regiments called State Volunteers, which were organized into brigades, divisions, etc., and which maintained throughout the war their distinctive and independent organizations.

Butchers	2
Brickmakers	2
Bricklayers	2
Grooms	2
Carmen	2
Mason	1
Rivetter	1
Saddle-tree maker	1
Clerk	1
Blacksmith	1
Slater	1
Steam-thresher	1
Woodman	1
Baker	1
Cabman	1
Bootmaker	1
Under ship's steward	1
Total	104

Out of the whole number in the company 58 live in villages and small country towns, 37 came from the two big seaports, and 9 live out of the county.

The system which we then adopted would be open to certain objections even if the details of the organization of the force were carefully arranged in time of peace, but to leave all these matters until the time when soldiers must be sent to the front, is worse than foolish.

The new force to which I have referred is intended to embody most of the merits of the old volunteer force, while avoiding its admitted defects; it is to be local in character, but national in organization. The nucleus of its formation is to exist at all times, and it is to have its recognized place in the military system of the country. It should, like the volunteers in our last war, take the intermediate place between the army and the militia, and should be the nucleus of the "citizen army" upon which we should have to rely if we were engaged in a great war. It is for this reason that I have suggested calling it the "Volunteers."

This force would, like the army, have its own reserve; the men doing active service would form the First Volunteer Battalion of their regiment, and the Reserve, when called out, would raise the First Battalion to its war-strength, and form the Second Volunteer Battalion of the regiment.

Should the number of men, including reserves in the army and the volunteers, be too large for one regiment, the surplus could at once begin forming the Second Regiment of the district. Members of this force should be permitted to change their enlistment in the volunteers to an army enlistment; and if an enlisted man in the army is allowed to cancel his enlistment, there should be provisions made for permitting him to go into the volunteers.

Let me emphasize here the fact that the theory of our Constitution and laws is that all this work should be done by the militia. But we are confronted with a condition which is at variance with this theory. If any practical way can be found for bringing the facts into harmony with this theory, every effort should be made to accomplish so desirable an end: my suggestions regarding the volunteers are not made because I do not think that the militia should do all this work, but because, in spite of recommendation and reports from our highest military authorities, but little is accomplished in bringing about the most necessary changes. Furthermore I do not think that at present the members of the existing militia organizations expect that they are to become at once our fighting army in case of a foreign war of great magnitude, and even if they do hold this idea and are ready to

XUM

coöperate with the National Government in carrying it into operation, I do not think that the existing State organization, as I have pointed out above, will secure such a force as the nation would need.

When the militia formations are brought into harmony with the army organization, and when the States organize their forces with regard to national as well as local needs, the necessity for such a force as I have described will in a great measure be done away with. But what I have seen of the militia leads me to think that it will be long before these wished for results can be obtained. In the meantime, and possibly as a stimulus to the existing militia to develop its capacity for serving the nation I would suggest the organization, on a small scale, of the volunteers, giving to this force its designated place in our plan of organization. Experience will show how such a force can be most successfully developed, and our first efforts should be tentative with small formations: its greatest usefulness would be in sea-coast defense, and its first formations should be batteries of heavy artillery.

If the volunteers were organized as a part of our military system there should be, beside the active officers, a "waiting" or "retired list" of officers. The active officers should be those who perform all the duties of their rank with the force whenever it is called out; the waiting or retired list should be made up of officers who have the proper qualifications, or have passed successfully the tests which I describe below, but who do not desire to perform the active duties of their rank in time of peace, and yet are willing to accept a commission and hold themselves subject to duty when the Government might call upon them.

Any army officers who wish to retire from active service should be given the preference for commissions in the volunteers, and any such officer wishing a commission in this force should, subject to the approval of the President, be given it, the President being free to assign him to such command and with such rank as the interests of the service demand.

Militia officers should be permitted to apply for commissions in this force, either to go into active service or to be put upon the retired list, upon the following terms and conditions:

1. The national government should permit the formation of classes for instruction, to be composed of militia officers, at one or more military posts in each military district. The class should be

permitted to pass the designated time, say a month, at the garrison, fort or station selected for the purpose. Certain officers should be detailed to give the necessary instruction, and should be especially charged with noting the aptitude of the candidate for instructing and drilling men, and discharging the practical duties of officers.

2. A militia officer, with the approval of his regimental commander, should be permitted to be attached to a company or regiment of the army for a given time, say a month.

At the end of the time spent with a class of instruction or with the regular forces the militia officers should be examined. The examination should of necessity cover some matters of theoretic knowledge, but it should so far as possible be made a test of the officer's ability to instruct, drill and lead his men; not the least important part of the real examination should be the careful observance of the candidate in the daily performance of his work during the time he is with the troops. Militia officers who successfully pass these tests should be given national commissions in the volunteers; those who wish to serve with this force would have to resign their State commissions, and would become active officers of volunteers; those who prefer to retain their positions in the militia would get their national commisions, but would be placed on the retired list of that force without pay or emoluments.

I believe that many militia officers would be desirous of holding such commissions, and would gladly give the time necessary to go through the prescribed course of work. A wholesome emulation between the militia organizations would lead each regiment to wish for the largest possible number of officers who had successfully passed these tests. These militia officers would profit by the practical experience in the army under the supervision of army officers, and the Government would have the advantage of having a list of those militia officers who had, under the supervision and criticism of army officers, been qualified to receive a national commission. Militia officers might also be permitted to go for a certain specified time to Fort Monroe, Fort Riley or Fort Leavenworth. Under certain restrictions, perhaps, after having obtained a commission in the volunteers, they might also be permitted to volunteer for active service in the West.

I would also recommend that, subject to the approval of the officer commanding the district, those who were not officers of

the militia should be permitted to join similar classes of instruction after successfully passing a preliminary examination, the scope and character of which should be determined by the proper authorities. There are undoubtedly many persons in civil life who would make excellent officers, who will not enlist in the militia for five years with the possibility of serving as privates most of the time. The plan which I have suggested would enable the Government to have the services of such of those as qualified themselves to discharge their duties as officers.

Provision should of course be made in our army organization for all the necessary special services, but the auxiliary forces, by reason of their character and composition, are especially adapted to provide certain branches of service which are exceptionally valuable to a campaigning force. For example the practical advantage of a good signal service corps cannot be overestimated. These corps now exist in some of the military organizations, but the great danger with an independent arm of the service, such as this, is, that by lack of interest, or enthusiasm, or by an unfortunate choice of officers, it may fall below the proper standard of efficiency. In the plan of organization to be adopted for the militia, there should be arrangements for a proper proportion of signal service men. I would recommend that arrangements be made in each district for holding an annual examination by army signal officers of the militia signal corps; such examinations would stimulate officers and men, would serve to indicate the character of the work done, and would point out any falling off in the efficiency of this service. It would bring the corps into closer relations with the army signal service, and would ensure to the militia a corps which could be relied upon for practical service, and one capable of working, should it be necessary to do so, in connection with army signal corps. Although attendance upon such examination could not be made obligatory, I am satisfied, that practically all the men in that branch of the service would gladly undergo the test.

There is no country except America which has not incorporated cycling in its military system. We possess a large number of men schooled as cyclists who are eminently fitted to perform the duties which would be required of such a corps. Our militia, by reason of its character, seems to be particularly adapted for the formation of cycling sections, and I would, therefore, recommend that in the organization of the militia and the volunteers,

arrangements be made to have each brigade contain a certain number of cyclists, either organized as a distinct corps or as cycling sections of infantry formations.

We are entirely without any railway or transport corps, the importance of which in a country so vast as ours cannot be overestimated. Valuable and efficient corps could easily be organized in the auxiliary forces. They should not only be familiar with all the details of railway management and transportation, but also with all the questions connected with the use of our railroads for transporting troops from one place to another, and the bearing of different lines upon the defense of given places. In addition to these corps in the militia it might be advisable to have a staff organization in the volunteers, who would be obliged in addition to other duties to study all these questions from the standpoint of the nation's needs in time of danger. The use of homing or carrier pigeons is now admitted to be of the greatest service in a campaigning or fighting force, and all the countries of Europe are training birds for use in case of war. Here again it is possible to add to our militia this branch of service, and to arrange in time of peace for the great advantages which would result from such a service in case of war.

The medical staff varies widely in efficiency in different States, and has never been properly developed in more than two or three of the States. This service should be improved in the militia, and the volunteers should be given their own medical staff and corps.

I have only referred to these various services without going into the details of their work or emphasizing their value and importance, because all these points are well understood. I merely wish to point out how these services can be secured at small relative expense and in a uniform and satisfactory degree of efficiency; they do not exist, except in rare instances, at present, because the various militia organizations are regarded as purely State forces, and in most instances limit themselves to the development of infantry bodies; consequently the State authorities do not look at the question of military organization from a sufficiently broad standpoint to see either the need or the value of these services; where they do exist there is at present no common standard or test of efficiency, and they might easily degenerate into useless additions to the force.

By inspections and examinations such as I have referred to

XUM

elsewhere, the condition and efficiency of these corps would always be known and they would have common methods of work and a common standard of excellence.

While it is of importance that all our forces should be organized as component parts of our armed strength, there is nothing in such a system which prevents our recognizing the different character of the forces or even anticipating giving to them different kinds of duty. Our military system should include such modifications of our organization as might be made necessary by a war of great magnitude or long duration, In the event of such a war I do not think that the militia, however closely associated with the army, would be the force we should rely upon to do all or even the greatest part of the fighting; our army would be increased somewhat and the volunteers would be greatly augmented, many members of the militia who desired active service joining this force as officers or otherwise. They would undoubtedly do this in large numbers, but there would still remain a large militia force which could do important work in the rear of the fighting force where it could guard communications, garrison important places behind the fighting line, and serve as a training-school for officers and men who were to be sent to the front.

It may seem unnecessary to reiterate the need of completing our organization before hostilities begin. Those who remember how much we suffered during our last war from lack of proper organization when the troops took the field, will agree that our need in this respect cannot be stated with too much emphasis. There was no such formation as an army corps until March, 1862. In the Army of the Potomac there was no complete artillery organization and command, except the "Artillery Reserve," until the winter of 1863–64, and all through the war we were endeavoring to work out, while engaged in actual warfare, the proper organization of this arm of the service. On the question whether a battery was the equivalent of a company, a battalion or a regiment, the General-in-chief and the Adjutant-General of the army, the two highest military authorities, were at issue. "So," as General Hunt says, "both principles were adopted, and to the end of the war the artillery was deprived of general officers because the batteries were companies, and of field officers because batteries were regiments,"* and of course all promotions ceased in the artillery; and

* "Our Experience in Artillery Administration," by the late Major-General Henry

in the concluding paragraph of his last official report as commander of the artillery of the Army of the Potomac General Hunt said: "I do not hesitate to say that the field artillery of this army, although not inferior to that of any other in our service, has been from one-third to one-half less efficient than it ought to have been, whilst it cost from one-third to one-half more money than there was necessity for; this has been due principally to want of proper organization."

It is not necessary to quote from present reports and papers in order to show how anxious our best military authorities are for an improvement in our recent organization, or have I thought it best in this paper to call attention to such matters as the need of improvement in the fighting organization of our sea-coast batteries.* The last report of the Secretary of War says of one feature of our infantry organization "that it is so vicious that the first step in case of war would be to abolish and start anew."† It is a cause for keen regret that such statements can be made without securing the immediate correction of the evil especially when all must admit that "proper organization is essential to the efficiency of the army." We are unfortunate, not only in being without proper organization, but also in being without a properly constituted and recognized authority to study and report upon those questions of organization and administration which are at the present time so vital to the efficient condition of an army. It would be well for us if we had a body of officers corresponding in character to the German General Staff. Officers trained as thoroughly as are the members of this staff, are of the greatest value to an army when actually engaged in war; and in time of peace the confidence which the German people feel in the ability of this general staff and the widespread interest and confidence which the people feel in everything which emanates from it give its recommendations the utmost weight. When the German General Staff reaches a conclusion on any military subject the nation accepts its decision as final, because the people know that the most able and best trained officers in the army have studied the subject in all its bearings and that their judgment of

J. Hunt, U. S. A. A paper read before the Mass. Hist. Soc. in 1888 and printed in the JOURNAL OF THE MIL. SERV. INST., March, 1891.

* "Magazine Staff and Ammunition Service in a Sea-coast Fort." Capt. Chester, 3d U. S. Artillery, in JOURNAL OF MIL. SERV. INST., Nov., 1891.

† This statement is made by the Secretary of War in his report for 1891, when speaking of the need of adopting the three battalion organization for the infantry.

the needs of the army is founded upon a patriotic consideration of what the nation needs. And I doubt if history can show an illustration of greater confidence in tried officials or a more striking instance of public recognition of the merit of a picked body of officers, than the action of the German people a few years past when the staff asked for an increase of the army and the taxes necessary for this purpose. Bitterly as Bismarck was opposed by certain elements of the people and violent as were some of the opponents of his policy in the Reichstag, the proposition to add thousands of men to Germany's available force, coupled with a request for $80,000,000 to carry out the necessary changes, was carried by an unanimous vote.

England and America offer a striking contrast to this. In both of these countries, owing to absence of any such recognized authority, any proposition for a change is generally met by the appointment of a commission. But it is the exception when this results in anything more tangible than the submission to Parliament or Congress of the valuable reports which, after months of study and investigation, these commissions prepare.

With us, the artillery point out their needs, the infantry theirs, enthusiastic militiamen call attention to the defects of their force; but there is no consensus of opinion on these subjects, no treatment of these questions from the broad and comprehensive standpoint of the nation's needs, and the ablest opinions on any subject have for the public no more weight or importance than is accorded them by the few individuals who take the trouble to study them.

In England, and with us, officers high in authority often advocate the most opposite action on important military questions, and it has happened that the late Lieutenant-General and the Adjutant-General of the army differed diametrically in their recommendations to the Secretary of War on the same subject.

Our Bureau of Military Information will undoubtedly accomplish results of which we may be justly proud; with its development as an important part of our military system we may hope to see the training of our officers brought to the highest point of perfection. There is no reason why our officers should not be as proficient in the theory and practice of military science, as any in the world. Much has been done recently to encourage and stimulate honorable ambition in the service, and as this important work goes on we shall find the people through their representa-

tives in Congress more ready to carry out those changes and improvements in our military system which the proper authorities consider necessary to the efficiency of our armed forces.

When the army comes into closer relations with the people they will realize that the interests of the army and the people are identical, and that a patriotic desire for the welfare of the nation, and not a personal or selfish motive, prompts our officers to ask for these changes in organization and administration which are needed to increase the efficiency of our army.

CONCLUSION.

I have endeavored to lay down certain broad principles for the organization of the army.

I have suggested a plan for quickly increasing in time of danger the numerical strength of the army by calling to it men who have been trained in it, and who have served under the officers who will command them when they take the field. The principle of a short service with the colors, followed by a period in the reserve, would supply one of our greatest needs, in enabling us greatly to increase the numerical strength of the army at very short notice, while maintaining a small number of men under arms in time of peace. Whatever value other forces may possess, it will be admitted by all that any addition to the strength of the army, is relatively of more value than a proportionate increase in the militia or volunteers.

I have recommended that we should adopt the territorial system partly because it will increase the knowledge of, and interest in the army among the people at large and bring the citizen and soldier into closer relations; but chiefly because it is absolutely essential to the rapid and successful mobilization of the reserves which we should have if the system of short service is adopted.

I have called attention to the fact that these changes in organization would aid us in raising the tone of the enlisted man and would make it easier to attract to the army a better class of men than now enlist;* they would bring the service into greater harmony with our republican form of government by making the army more representative of the people; all this would tend

* "The changes which have recently been made in the method of recruiting, have produced the most satisfactory results." The report of the Secretary of War, Nov., 1891.

to make the service "better worth the seeking," and would eradicate the present unfortunate popular conviction that the army is largely composed of men who cannot succeed in any other occupation.

In regard to the militia I have endeavored to suggest such changes in their organization as can be carried out and which will bring them into closer relations with the army. I have the highest estimate of the personnel of this force, but their present independent organization has resulted in greatly diminishing their usefulness for national defense. For several years past the Government has been disposed to aid the State forces in increasing their efficiency; I recognize the advantage to all concerned from what the Government has done; my suggestions are in entire harmony with its attitude in this matter, and only aim at so modifying the organization of the National Guards that they will take their proper places in the general plan for the organization of our armed forces, without having the present State control in any way interfered with; if more can be done in this direction than I have suggested I should feel that we were most fortunate;* but the fear,—rather the conviction,—that it will be long before any very satisfactory results will be accomplished in this direction, has led me to suggest the tentative organization of the volunteers, chiefly for heavy artillery.

To leave the organization of a force until it is in front of an enemy is always costly and generally disastrous; we have made this mistake once, there can be no excuse for repeating it.

Organization is more potent than mere numerical strength; whether our army is large or small, its organization ought to be perfect.

No great nation has so simple a military problem as America. We have no jealous or threatening neighbors. We have no inherited race quarrels which have been such potent factors in hastening war; we are by reason of our great numbers and vast territory absolutely free from all danger of a war of conquest. Our only need is that we should be in a condition to discuss international questions with foreign powers without having our greatest cities and their vast wealth and commercial interests absolutely at the mercy of those powers. While we can easily afford

* Many able papers have been written on the subject of the organization of the militia. I desire to call especial attention to the prize essay by Lt. Sharpe in the JOUR. MIL. SERV. INST., March, 1889.

the money loss which the ransom or destruction of our sea-coast cities would entail, we cannot afford to undergo such a needless humiliation.

We are strengthening our navy and improving our coast defenses. With the proper organization of our armed forces we shall offer no vulnerable point to possible enemies.

"If, as some people hope, this country is to exert upon the world the beneficent influence of a great people raising their voice only for what is right, and meeting other nations in such a spirit that the inevitable differences of opinion which from time to time may arise between the most friendly nations are to be settled without bloodshed, that influence will be strengthened and widened if it is an unquestioned fact that we can resist and punish any attacks which foreign nations in the excitement of some great controversy might be tempted to make upon us."

"Whatever may be the judgment of Congress respecting the aggregate strength of the military force to be maintained in time of peace it cannot be doubted that the organization of the force should be such as to make it most effective and at the same time capable of the most ready expansion whenever an increase is decided upon."*

The suggestions contained in this paper are made with the hope that the changes which are recommended will secure for us such an organization and give us "The army organization, best adapted to a republican form of government, which will ensure an effective force."

* Report for 1891 of the Major-General commanding the army.

THE USE OF FIELD-WORKS IN MILITARY OPERATIONS.*

By 1st Lieut. A. L. PARMERTER, 21st U. S. Infantry.

AT the present time the value of field-works in military operations and especially on the field of battle can scarcely be overestimated. This importance has continually increased with the improvement in arms, until now the use of field-works is recognized as one of the most important elements for the successful prosecution of a campaign, offensive, or defensive.

By field-works, in this article, is intended the various kinds of artificial shelter constructed and utilized by troops as a protection from hostile fire.

This kind of protection, or a substitute for it, has been used from the very earliest times of which we have any record. Protections made of earth and intended as a means of defense, probably date with the very earliest, and remains of them are found in many countries and of an antiquity that is undoubted.

In more recent times the members of a weak tribe of savages have been known to throw up circular intrenchments of earth to afford protection for themselves, and to enable them to hold out against a much larger force of their enemies. This principle of enabling a small force to hold out successfully against the attack of a much larger, is an important one in the use of field-works at the present time. And the same idea of self-preservation that induced the soldier of earlier days to make use of various expedients as a means of protection, leads the soldier of the present time to make use of earth-works to accomplish the same end. The instinct of self-preservation is the paramount one that actuates the private soldier in throwing up the little pile of earth in front of him; the commanding-general, however, sees other advantages in it, besides that of its power to stop a bullet.

Although it would be interesting and instructive to trace the development and use of works of this description from early

*Graduating thesis at the U. S. Infantry and Cavalry School. Publication in the JOURNAL OF THE MIL. SER. INS. authorized and recommended by the Staff of the School.

times down to the present, it would be beyond the scope of an article of this kind, the intention of which is to set forth the most salient principles for their use in offensive and defensive operations, together with a brief history of their development and use in recent wars.

The use of field-works on the battle-field is the direct result of the improvements made in fire-arms, the change from the smooth-bore to the rifled arm, and especially of the introduction of the breech-loader. The increased range and accuracy of the rifle over the smooth-bore rendered it necessary when the former came into general use to provide some means of protection from its fire, and this led to the use of field-works on the battle-field and in positions where an action was liable to take place.

A brief glance at the latest wars, from the American Civil War of 1861–1865 to the Russo-Turkish War of 1877–1878, will show the great development in the use of earth-works in the field.

As an important element in military operations, field-works began to be used toward the beginning of the Civil War, and their use continually increased until the last year of the war saw the intrenching of every position, as soon as it was occupied by the troops, whether they were acting offensively or defensively.

The first cause that led to the extensive use of such works was to guard against surprise. This was necessary on account of the thickly wooded nature of the country, which prevented a careful watch on the enemy's movements. But the value of such works in strengthening a position was soon appreciated by both sides. The character of the works gradually changed from hastily constructed rifle-pits to continuous lines of shelter trench of considerable strength, as officers and men came to understand their value.

The shelter trench consisted of a ditch with the earth thrown toward the side of the enemy, with no regular form of profile. Very good cover could be obtained in this way in from fifteen to twenty minutes, even where the troops were unprovided with intrenching tools and had to rely on their tin plates, cups, knives, bayonets, and an occasional shovel and spade. Where time admitted these works were strengthened; sometimes a ditch was added in front, and if the field of fire was not open, abattis and entanglements of brush were resorted to, in order to delay the enemy and hold him under fire. Very seldom was it found necessary to resort to any flanking arrangements. The country

over which operations were carried was generally heavily wooded, and this naturally led to the use of timber in works of this kind. Logs were rolled up in a pile and the earth from the trench thrown over them.

A careful study of this war shows a steady advancement in the use of field-works. During the operations in 1862 their use was by no means general, and the larger battles especially, as Manassas, Shiloh, and Antietam, were fought without their use on either side; however, they were more or less used in many of the smaller engagements.

Grant's surprise at Shiloh on the first day of the battle might have been avoided by a judicious use of such works, by means of which the advance of the Confederates could have been checked, and time gained. After this on the advance to Corinth, at the end of each day's march, defensive works were thrown up along the whole front of the position occupied.

Works of this character were largely used around Vicksburg. The defenses there consisted of a chain of simple field-works connected by a line of rough rifle trenches. These works were bombarded by the fleet of vessels on the Mississippi under Admiral Farragut, and then assaulted on the land side by General Sherman, on December 29th, but the attack was repulsed. Again the works were assaulted by General Grant's forces on the 19th and 21st of May, 1863, in the latter case after a heavy bombardment by land and river, lasting until 11 A. M. All the assaults were repulsed with heavy losses. In the second attack, although a few works were carried, they could not be held, and the greater part of the attacking troops never reached the lines. In the third, although Grant had about 30,000 men to Pemberton's 18,000, the attack was repulsed with fearful loss. The distance to be crossed under fire varied from 80 to 400 yards. On the 23d of May, Grant, seeing the difficulty of taking the position by direct assault, began a regular siege, which resulted finally in the surrender of July 4, 1863. These works allowed of a successful defense to be carried out for 213 days.

During the year 1863, we see a gradual increase in the use of intrenchments, although, as in the preceding year, some of the large battles were fought almost without their use. At Gettysburg, the most important battle of the year, the Federal line was but slightly intrenched in some parts. Strong natural cover, however, compensated for this to some extent.

XUM

In the East, early in the year, was fought the battle of Chancellorsville. Hooker, in command of the Federal forces, crossed the Rappahannock to operate against Lee who held Fredericksburg. After crossing and arriving on Lee's flank he halted and intrenched his position instead of attacking at once. Hooker's left rested on the Rappahannock, with his front on a line nearly at right angles to the general direction of the stream. Lee held Hooker in position by demonstrations in front while he detached a force under Jackson to turn the Federal right. Jackson's attack was successful and the Federal forces were driven back, taking up a position parallel to the stream. Two days later Hooker retreated to the left bank of the Rappahannock.

In the campaign in the West, during this year, the Confederates made a more extensive use of intrenchments than did the Federal forces.

In 1864 the use of works of this character became so universal that the operations consisted of attacks made on positions so intrenched, or, where the position was too strong to be taken by direct assault, of a turning movement that compelled the retirement of the defenders, who however invariably occupied and intrenched a position a little further in rear.

The Atlanta campaign furnishes an excellent example of an inferior force acting on the defensive and checking the advance of a greatly superior one, by the correct use of field-works. Without their use the campaign would have been ended in a much shorter time.

General Johnston, commanding the Confederate forces in Georgia, had carefully considered his method of operation and had decided, owing to the existing condition of the Confederacy, that nothing but a defensive campaign was possible, unless a great blunder on the other side should permit the offensive to be assumed; it is needless to say that this blunder was never made.

General Cox says on this subject: "Right or wrong, he deliberately adopted a plan of carefully intrenched lines, one succeeding the other, as he might be compelled to retire. He practised a lynx-eyed watchfulness of his adversary, tempting him constantly to assault his intrenchments, holding his fortified positions to the last moment, so well as to save nearly every gun and wagon in the final withdrawal, and always presenting a front covered by such defenses that one man in the line was, by all sound military rules, equal to three or four in the attack. In this way he constantly

neutralized the superiority of force his opponent wielded, and made his campaign from Dalton to the Chattahoochee a model of defensive warfare."

That his conduct of the campaign was justified is shown by the result when his policy was changed by his successor.

Sherman's plan to oppose this method of defense was to contract and shorten his line as much as possible, strengthen the position held by means of field-works, and thus free a considerable portion of his force for a turning movement.

Sherman in his Memoirs says: "Still I pressed operations with the utmost earnestness, aiming always to keep our fortified lines in absolute contact with the enemy, while with the surplus force we felt forward, from one flank or the other, for his line of communication and retreat."

The use of field-works in this campaign is well described by General Cox:

"The character of the intrenchments changed by the natural increase of experience and the education which it gave. It did not take long to learn the advantage which cover gave, when rifled arms had more than doubled the range of effective fire.

"In the open, a covered line could be sure of crippling an attacking force while it was passing over eight hundred or a thousand yards, so that its power to harm would be gone before it reached the ditch. In the woods, an abattis or entanglement in front of the breastworks produced the same effect by delaying and holding the enemy so long under fire that he was no longer formidable when the obstruction was passed.

"From the combat at New Hope Church onward, it may be said that every advanced line on both sides intrenched itself as soon as a position was assumed. On our side the practical method was this. A division having been moved to a place it was expected to hold, the general in command, by a rapid reconnaissance of the topography, determined the most available line for defense, and directed brigade commanders to form their troops upon it, following the outline of the ground and making such angles, salient or re-entrant, as it required. The skirmish line was kept in front, the rest stacked arms a few paces in rear of the intended place for the breastwork, intrenching tools were taken from the wagons that accompanied the ammunition train, or were carried by the troops in the movement, and each company was ordered to cover its own front. Trees were felled and trimmed, and the

logs, often two feet thick, rolled into the line. The timber revetment was usually four feet high, and the earth thrown from the ditch in front varied in thickness according to the exposure. When likely to be subject to artillery fire it was from ten to thirteen feet thick at base, and three feet less on the upper line of the parapet. Skids or poles, resting on the top of the revetment at right angles to it, sustained a head log, a horizontal loop-hole for firing under it being about three inches wide. The skids, when left in place, served to prevent the head-log from falling upon the men in the line if it were knocked off by a cannon-ball. The timber in front was then slashed so as to fall outward, making an entanglement which was too heavy for removal, and which utterly broke the formation of any line attempting to pass it. Indeed, it would be only painfully and slowly that single men could clamber through it. As the troops became familiar with the work, they were able to cover themselves with an intrenchment of this kind within an hour from the time they stacked arms.

"Circumstances would, of course, vary the character of these lines, and in special cases the engineers would plan particular works. The usual custom, however, was that stated, and the intelligence of the soldiers was such that their eye for a position was often as quick and keen as that of any of their officers.

"The Confederate troops were differently situated and proceeded a little differently. Anticipating the necessity of retreating to a new line, Johnston directed his chief engineer to prepare it beforehand.

"In the construction of these the Confederate engineers used the Georgia militia and impressed negroes; and in some respects they were even more elaborate than those built by the National army. At exposed places they were covered by *chevaux-de-frise* made of logs pierced with sharpened spokes, and by sharpened palisades along the ditch. This, however, was exceptional, and the general character of the works was the same on both sides."

The great containing power of these works made it impossible for them to be carried by direct assault, at least without great losses on the attacker's side. In fact Johnston's great desire was to have Sherman make such assaults, and that Sherman thoroughly appreciated this fact is shown by his method of conducting the campaign.

That Johnston's plan of campaign was the proper one can hardly be doubted when we consider the fearful losses and great

demoralization that followed the offensive operations of his successor, elements that should have been avoided on the part of an army already numerically inferior.

When Hood relieved Johnston it was with the understanding that he (Hood) was to take the offensive; but the results of his first operations were such as to appall even the Confederate President himself. He wrote to Hood on August 5th: "The loss consequent upon attacking him [Sherman] in his intrenchments requires you to avoid that, if practicable."

Turning now to the campaign against Richmond in the same year, we find Lee making use of the same means to oppose Grant in his advance on the Confederate capital. In fact, after his defeat at Gettysburg, Lee never took up a position, even for a night, that he did not throw up works of some kind. In all the battles of the Wilderness campaign field-works were freely used; Wilderness, Spottsylvania Court House, North Anna, Cold Harbor, Richmond, and Petersburg. At Richmond and Petersburg the works were more than mere field-works, as much time and labor had been expended on them.

Grant in his Memoirs says:

"In every change of position or halt for the night, whether confronting the enemy or not, the moment arms were stacked the men intrenched themselves. For this purpose they would build up piles of logs or rails if they could be found in their front, and dig a ditch, throwing the dirt forward on the timber.

"Thus the digging they did counted in making a depression to stand in, and increased the elevation in front of them. It was wonderful how quickly they could in this way construct defenses of considerable strength. When a halt was made with the view of assaulting the enemy, or in his presence, these would be strengthened or their positions changed under the direction of engineer officers."

In order to make any progress Grant was compelled to resort to a method similar to that used by Sherman; a turning movement to flank the Confederates from their position. Neither side could effect much by direct assault. In connection with the subject of this paper, these two campaigns cannot be too carefully considered, as they illustrate the reasonable and proper use of field-works both on the offensive and defensive.

The following conclusions may properly be drawn from the operations of the Civil War:

XUM

1st. That the close nature of the country rendered field-works necessary to guard against surprise.

2d. That positions so strengthened were almost impregnable to direct assault, unless the attack was made with overwhelming numbers or against troops greatly demoralized; and that when such assaults were made they were always attended with heavy losses. Examples are Vicksburg, Kenesaw Mountain, Cold Harbor, etc.

3d. That a front attack could be carried out successfully if combined with a simultaneous flank attack, as at Chancellorsville and Nashville, etc.

4th. That a superior army could resort to a turning movement to compel an enemy to abandon such a position, by leaving a force intrenched in front of the enemy and sending a sufficiently large one to turn the position. Example: Sherman in Atlanta campaign.

5th. That field-works so strengthened a position that one man in the works was equal to three or four in the attack.

The result of numerous attacks made on the field-works around Richmond led General Wright to say, "that a simple trench, defended by two ranks of infantry, covered by abattis or other obstacles, and placed on a site which permits the range of the new arm to be utilized, is absolutely impregnable except by surprise."

If the lessons of our Civil War in this direction had been more fully learned, the campaign of 1870–71 might have resulted very differently for France. Both sides could have obtained knowledge that should have materially modified their methods, especially at the beginning of the campaign.

The mode of operation adopted by Johnston in his defensive campaign in Georgia, would, when the nature of the country permitted, be the proper one for a State to resort to in order to gain time to develop its resources. It took Sherman more than two months to force Johnston back one hundred miles. At the beginning of the Franco-Prussian War some such method as this might have been resorted to by France when she found her adversary so much better prepared for war than herself.

In future wars intrenched positions will be subjected to a much heavier fire of artillery than was the case in the Civil War. In the latter the character of the country prevented, in many cases, the preliminary use of artillery in large masses as a preparation

XUM

for the attack. Grant, in the Wilderness campaign, was compelled to send to the rear a large proportion of his artillery, in a campaign where, owing to the extensive use of field-works, it would have been of the greatest value; but the nature of the country would not admit of its use and it was therefore an incumbrance, blocking up the roads that were few and poor.

WAR OF 1866.

The next war, that of 1866, affords no good examples of the use of field-works. Those constructed at Königgrätz were not properly placed and occupied. The short duration of the war prevented any great development in this direction.

WAR OF 1870–71.

In this war, waged by two of the most powerful of the European States, field-works were used to but a limited extent, and were confined to local defense instead of being used along the whole front of a position where necessary.

At the battle of Spicheren the 2d French Corps held a position with its right occupying the heights of Spicheren and its left extending into the valley leading to Forbach. There was but one position on the French right where guns could be posted to sweep the ground in front, and that was the Rotherberg; but as this point was subject to a cross-fire from the enemy's artillery, the French guns were soon silenced. Another weak element of the position was the wood on the steep slopes in front, extending to the low ground, the lower edge of which was not held by the French, so the German troops were able to reach shelter with comparatively little loss, and to make their way through to the upper edge. But as soon as they attempted to leave the woods to cross the open space in front, the fire from the intrenched position back of Spicheren was so severe that they were quickly driven back and were not able to advance further, until success on other parts of the field allowed this to be turned.

In this battle the assailants were able to advance as long as they could find cover to protect themselves from the fire of the defense; but when this was no longer possible they were brought to a standstill.

The French position was weak in that it was partly on high and partly on low ground, so that the resulting action partook of the nature of two distinct fights. In front of the right was a wood, the lower edge of which could not be held. Then again

the very steep slopes of the Rotherberg prevented the French, from their shelter trenches, from seeing the foot, so that the Germans after gaining this point could advance, sheltered from fire, until a few paces from the French line.

At the battle of Wörth we see about the same result. The French position was on a line of heights forming the western boundary of the valley of the river Sauer. The position taken up was about four and one half miles long, and was held by McMahon with about 36,000 men. On the slopes in front of the centre was a line of weak shelter trenches held by one brigade, about 4000 men. This position was shelled by a battery of 120 guns placed on the opposite plateau of Diffenbach, 2000 yards distant, then assaulted by infantry. But in spite of the fact that 25,000 men were pushed against it, the position could not be taken until the French right, not intrenched, was defeated and driven back, thus allowing the centre to be taken in flank and rear.

Had the whole position been strengthened by field-works in the manner that the time allowed of, it could probably have been held against a direct attack.

In both these examples the part of the position intrenched was held against assault, until success on other parts of the field allowed of its being taken in flank and rear. At the battle of Wörth it required a force of more than two to one to carry the position.

In the operations around Metz field-works might have played a very important part. It seems probable that Bazaine might have effected his retreat on Verdun by a judicious use of them to neutralize the enemy's superiority in numbers. If, instead of trying to hold on to Metz, he had let go of that place and extended his line to the west, continually intrenching his new front as he took it up, his successive positions could have been made too strong for direct assault. By operating in this way, there seems to be little doubt but that he might have reached the line of the Meuse in safety.

The position occupied by the French on the 18th August was one of great natural strength, and had it been properly intrenched, wherever necessary, throughout its whole extent, it is doubtful if the Germans could have driven them from it. The right at St. Privât rested on no natural obstacle and was but slightly strengthened by intrenchments, as there was no engineer park with the 6th Corps, which held this part of the line. The position

XUM

was about seven miles long and during the battle no part of it was forced except on the right, and there the loss of the Germans was enormous. The first attack was made without a sufficient artillery preparation, and was repulsed, nearly 6000 men falling in ten minutes, while still at a distance of 1500 to 2000 yards.

The extreme left was held by the 2d Corps. General Frossard, the corps commander, says on this subject: "If the losses of the 2d Army Corps at the battle of Gravelotte were comparatively small, this is undoubtedly owing to the precautions taken in sheltering the men behind earth and epaulments, and to the care taken in profiting by all depressions in or excavations of the ground, not by allowing the troops to hide behind such things, but by using them to protect the men when firing. We have never seen so remarkable an instance of the advantages which this method of intrenchment affords."

In this battle the only part of the position that was forced was on the right at St. Privât. Along the rest of the front the German advance was in every case checked. This was due to the fact that this part of the line was more strongly intrenched, and afforded a good field of fire, with the additional advantage that the ground was such that the German artillery could not advance to coöperate with the infantry attack.

The operations on the Lisaine in January, 1871, are also instructive, as showing the important part that field-works may play when properly used.

Bourbaki with 150,000 men was moving to relieve the fortress of Belfort, which was invested by the Germans. Von Werder with about 43,000 men was intrusted with the task of opposing Bourbaki. Without going into the details of the operations, it is enough to say that Von Werder, by a judicious use of field-works at known points of advance, finally compelled Bourbaki to retire without effecting his object.

The investments of Metz and Paris furnish examples of the use of field-works for the purpose of strengthening a defensive position. In the first case the investing force was not much greater than that enclosed; while at Paris the French force was the stronger numerically but inferior in quality.

We see during this war numerous instances where direct attacks on positions, even weakly intrenched, failed, and if finally successful, were generally so after a flank had been turned. That when a direct attack did succeed it was due to the fact that,

XUM

either the ground in front of the position was so broken as to allow the attacking force to approach within a short distance unexposed to fire, or the defenders were greatly demoralized by being poorly covered from the preparatory artillery fire of the attack.

The German superiority in numbers allowed them to make use of a turning movement in conjunction with the frontal attack. This front attack was made strong enough to hold the enemy in position and prevent him from detaching troops to oppose the turning movement.

In the Franco-Prussian War the conclusions arrived at from the operations of the Civil War are fully substantiated. In this war, however, artillery was much more extensively used in preparing the attack.

RUSSO-TURKISH WAR, 1877–78.

In the Russo-Turkish War, field-works were used to a greater extent than in any of those previously considered. The Turks relied greatly upon them from the beginning and fought a defensive campaign from behind their protection. On the other hand the Russians were inclined to look with disfavor on anything in the shape of artificial cover, especially if obtained at the expense of considerable manual labor. And it was only after they had learned the value of it by harsh experience, that they made use of it.

At the beginning of the campaign the Russian right wing, under General Krüdner, crossed the Danube near Nikopolis, and after meeting with considerable resistance captured that place. While these operations were going on, Osman Pasha with about 40,000 men was moving eastward from Widin, while a force of from 10,000 to 12,000 men was advancing from Sophia by way of the Plevna road. A portion of this force was sent to Lootcha. On the 18th July, General Krüdner received orders from the Grand Duke to occupy Plevna as quickly as possible.

On the 19th the Russian force sent to execute this order, stumbled onto the Turkish position in front of Plevna, which at this time was but slightly intrenched. The commander of the Russian forces ordered a general attack on the position for the next day, July 20th, which was repulsed. The Russian losses were 22 officers killed and 52 wounded, and 2771 men killed and wounded. Nearly two-thirds of the officers and one-third of the

XUM

men were placed *hors-de-combat*. The attack was ordered with no knowledge of the strength of the position or the topography of the country, and, as was afterwards learned, against a force of four times their own numbers.

After this first repulse the Russians were reinforced and preparations were made for a second attack. The Turks, confident that this would come, were busy strengthening their position. The second attack was ordered for the 30th July. The Russian force at this time was about 30,000 strong, while the Turkish was 40,000. This attack was also repulsed with a loss on the part of the Russians of about 25 per cent. of all the troops on the field.

The following translation in the *Revue Militaire de l'Etranger* will give an idea of the works around Plevna from the first attack to its fall on December 10th.

"The intrenched camp of Plevna was constituted of works raised by degrees. At the time of the first Russian attacks on the 20th and 30th of July, the position facing northeast and east about Grivitza and the Tutchenitza ravine was alone fortified. On the 12th September it was perceived that works had been erected on the heights of Krichine, and lastly, in the course of the months of September and October, the Turks raised a series of intrenchments on the heights of Opanets and Blazigas.

"The number of Turkish works, besides shelter trenches and ways of communication, amounted to 60; they were arranged in groups, and formed to a certain extent several separate intrenched camps.

"Thus, on the north of Plevna, the plateau of Opanets was occupied by eleven redoubts which mutually supported one another.

"Further on, on the crest of the heights of Bykovets, which followed the Grivitza chaussée, there was established an intrenched camp about two versts (1⅓ miles) in length, surrounded by several closed works joined by trenches and reinforced by batteries in the intervals. In front of this camp stood the two redoubts known as the Grivitza redoubts.

"The space between the Grivitza chaussée and the Tutchenitza ravine was defended by nine or ten works, disposed on three lines, and by a series of trenches. The Turks had again nine redoubts on the heights of Krichine and the Montagnes Vertes. Lastly the groups of fortifications of Blozigas facing the south, consisted of ten works, of which several were still unfinished on

the 10th December. There were besides, batteries and trenches constructed in the intervals."

The Russian force around Plevna was continually strengthened, and at the end of August numbered about 105,000 men. They continued their preparations for another great attack. Their plan was, after gaining possession of Lootcha, to attack Plevna on the north, east and south.

On the 30th of July, after the second repulse, General Skobeleff was ordered to Selvi. From this point he made a reconnaissance in force against Lootcha on August 6th. This was conducted with such skill that the Turks developed their full strength. His topographers also made accurate sketches of the position.

On the 1st and 2d September, Skobeleff had gained possession of the dominating ridge east of the town, and had intrenched it and constructed epaulments for 56 guns. The guns were dragged into position during the night.

The attack was commenced at 5 A. M. September 3d, by the fire of the 56 guns, and shortly after 12 additional pieces were brought into action. The line of the Turkish position extended along a series of hills, the commanding point of which was at the southern extremity, called by the Russians the "Red Hill."

After about eight hours of cannonading the Turkish batteries were reduced to silence, and Skobeleff was ordered to attack. All the Turkish works were carried by 7 P. M.

In view of the fact that General Skobeleff was the most successful of all the Russian commanders in attacking the Turkish intrenchments, his order issued previous to the attack on Lootcha is of interest:

"The principal rôle, in the first period of the combat which is about to take place, belongs to the artillery. The order of the attack will be communicated to commanders of batteries, who are recommended not to disperse their fire. When the infantry advance to the attack, they are to be supported by the whole power of fire. The greatest attention is necessary; the fire is redoubled when the adversary presents his reserves, and attains its last limit when the attacking troops are arrested by an unexpected obstacle.

"When distance permits, shrapnel is to be fired against trenches and troops."

XUM

The value attached to the preliminary and supporting artillery fire is shown by this order.

After the first and second attack on Plevna, Osman Pasha continued to increase and strengthen the works about that place, and by the 1st of September there were 18 redoubts and several lines of trenches.

The Russian artillery opened on these works on September 7th at 6 A. M., and continued on the 8th, 9th, and 10th, and until 3 P. M. on the 11th, when the assault was made. Although this was partly successful, the Russian loss was so great that they were unable to hold the ground gained. The number killed and wounded was about 18,000. The Turks lost between 12,000 and 15,000.

Greene says that "The Russians were defeated at Plevna not because the position was impregnable, nor because they did not have sufficient force, but because they were ignorant of the enemy's position, and failed to concentrate their efforts upon the decisive points."

In the third attack we again see the manner in which artillery should be used to prepare the infantry assault.

The notable feature of this assault was the manner in which Skobeleff conducted his part of it. He sent forward his men in reasonably open order, reinforcing the first line when there was any sign of wavering; by adding fresh troops in this way a new impetus was given to the advance when it flagged, and he was thus able to push his troops through to the Turkish works. He was particularly careful to intrench every position won, and it was owing to this that he was able to hold his ground as long as he did.

In spite of the bombardment of nearly five days it is evident that the Turks were very little demoralized by it, as is shown by the resistance they offered to the assault. So we must infer that fire from field artillery has very little effect on works of strong profile; and that when the defenders are well protected by bomb-proofs, such a fire has little value as a preparation for an infantry assault.

After the third, no more general attacks were made. The Russians, continually reinforced, determined to invest the place, and General Todleben, the great engineer, was placed in command of the investing operations.

Numerous minor assaults were made by the Russians during

the progress of the investment, and were in general successful. In all these cases they were made against positions defended by field-works.

On the 10th December, Osman with about 40,000 men attacked the Russian position on the west side of the Vid, and being repulsed, surrendered.

There is no question but that the use of field-works gave Osman Pasha the strength to hold out for five months against forces so greatly superior. As long as he held Plevna the Russian advance was checked, for they could not push forward with a powerful enemy on their flank, unless that enemy was neutralized by a superior force left to mask the place. Osman's great mistake was that he held Plevna too long and allowed himself to be shut up instead of falling back in good season and taking up other positions in rear, on the line to the capital, which he might have done. Such positions existed, even stronger than Plevna, and as extensively intrenched.

One of the most brilliant as well as successful assaults on earth-works, during this war, was that made by Skobeleff on the Shenovo redoubts, which resulted in the surrender of the whole Turkish force at Shipka Pass, about 36,000 men and 93 guns.

The assault was made without any artillery preparation, against strong works well defended, and without any great superiority of numbers. Everything being ready Skobeleff formed his troops in the following order: In the first line was the 63d Regiment and the Bulgarian Legion; behind them came the 61st and 64th, and the Rifle Brigade. These troops moved forward to the assault without firing a shot, and on nearing the redoubts advanced against them at a run. A hand-to-hand bayonet fight inside the works gave the victory to the Russians.

Greene, speaking of this assault, says: "Skobeleff's energetic attack, as soon as he had got all his men together in the valley, was one of the most splendid assaults ever made, and renders more than doubtful the conclusion which has been hastily drawn from this war (from Plevna particularly), that successful assaults of earth-works defended by modern breech-loaders are impossible."

It is not necessary to follow the further course of the campaign which would merely add to the examples already given. Enough has already been said to show how an assault on a position, strengthened by field-works and defended by breech-load-

ers, should be made in order to insure reasonable hope of success.

Numerous examples show that where assaults were made with inferior numbers, over an open country, in a too compact formation, and not simultaneously on the decisive or key-points of the position, they invariably resulted in the defeat of the attacking party, as happened at the different assaults on Plevna and at Shipka Pass on July 17th. While on the other hand where the decisive points were carefully determined, and assaulted simultaneously with superior numbers in reasonably open order, and in successive lines, the assailants were successful, as at Nikopolis, Shenovo, and Kars.

As regards the effect of artillery fire on works of this character it would seem that, where the works are of weak profile and exposed to a heavy artillery fire for some hours, the defenders can be so demoralized as to render an attack reasonably certain of success. But if the works are of strong profile or the defenders are provided with bomb-proof shelters, artillery fire has very little value as a preparation for an infantry assault. This was shown very conclusively at the third attack on Plevna.

From the foregoing, although we cannot assume that a position strengthened by field-works is impregnable to direct assault, even without an artillery preparation, still such an assault would be so hazardous and so costly in men that it had better be avoided if possible; and in this respect we can learn a valuable lesson from Sherman's operations in the Atlanta campaign as to the best method to be pursued.

The modern idea of taking up a position is not to hold the entire extent of it with equal strength, but to hold particular points strongly and the intervals between less so. These strong points should be within supporting distance of each other and are determined to a great extent by the natural features of the position.

Every position from a tactical point of view can be divided into a defensive and an offensive zone. The former, containing the key of the position, should be strengthened in every possible way, by utilizing the strong natural features of the ground and by throwing up artificial works when necessary. In this way the strong points can be held by a comparatively small force, thus freeing extra men to be used for offensive operations over the offensive zone.

XUM

The fact that field-works are used should not be allowed to impress the men with the idea that the action is to be limited to a defensive one, for it is only by taking the offensive that any decisive success can be attained.

The works should be constructed in accordance with the general plan of the action and not scattered about at hap-hazard, but "at all times be made subservient to the action of the troops." If this idea is not kept in view the labor expended on field-works could as well be saved, as far as any beneficial results will obtain.

A striking example of this was seen at the battle of Königgrätz: "The Austrians appeared to have thrown up a good many intrenchments, but there was no tactical connection between the works and the troops; that is to say the Austrian engineers, acting under the orders of the commanding engineer of the army, made a number of works on the ground ordered by the General-in-chief Benedeck to be occupied, but it seems that the corps leaders and division leaders knew nothing whatever of these works, or the exact position they were to hold. They extended far beyond the position intended, and the commanding engineer riding round some hours after the battle had begun, found there were no troops near the works at all."

It must be understood that field-works to be of value must be used intelligently; their construction must be wholly with the idea of helping the attack; by this is not meant merely the action of a force on the offensive, but also the offensive return or counter stroke necessary to insure decisive results on the part of the troops acting on the defensive.

The Archduke Charles speaking of field-works says: "Like any weapon, they lose their value when badly used, that is to say when constructed without an object, without intelligence, and defended without bravery."

With regard to the use of such works on the offensive and defensive zones General Brialmont says:

"The defensive zone is that part the attack of which offers the most difficulty, either because the ground is covered with obstacles, or because the artillery can take favorable positions.

"The offensive zone is that where large bodies of troops can act freely and decisively.

"The object of fortifications on the former should be to stop the enemy as long as possible with as few men as possible.

"The object of fortifications on the latter should be two-fold:

"1st. To shelter the troops of the first line, until the moment everything is ready for attack.

"2d. To support the troops, if driven back after an unsuccessful attack, to stop the progress of the invader and prevent him establishing himself in the position he has won."

Although this use of works on the offensive zone has not the importance that it has on the defensive, still their use there is very essential. At the present time when the effect of both artillery and rifle fire is so terrible, some protection for troops on the offensive zone is necessary to prevent the loss of both physical and moral force.

On this zone the works should be of slight profile, such as rifle-pits and shelter-trenches, with wide intervals between in order to facilitate the advance of the troops that are to act offensively.

The moral effect of these works is very great, and in addition they form rallying points for the troops in case the counter-attack is repulsed; they also limit the extent of any retrograde movement.

The works on the defensive zone should be made as strong as time and circumstances will permit, and should be so placed as to take in flank the enemy's troops as they advance towards the offensive zone.

Another important consideration is the moral effect of field-works on the troops occupying them. General Sherman says that "The habit of intrenching certainly does have the effect of making new troops timid. When a line of battle is once covered by a good parapet, made by the engineers or by the labor of the men themselves, it does require an effort to make them leave it in the face of danger; but when the enemy is intrenched, it becomes absolutely necessary to permit each brigade and division of the troops immediately opposed to throw up a corresponding trench for their own protection in case of a sudden sally. We invariably did this in all our recent campaigns, and it had no ill effects, though sometimes our troops were a little too slow in leaving their well covered lines to assail the enemy in position or on retreat. On the defensive there is no doubt of the propriety of fortifying; but in the assailing army the general must watch closely to see that his men do not neglect an oppor-

tunity to drop his precautionary defenses, and to act promptly on the 'offensive' at every chance."

The difficulty of getting troops to leave cover can be reduced to a minimum by perfecting the discipline.

With regard to the line to be occupied by the intrenchments, it is enough to say that circumstances alone must decide, and upon a judicious adaptation of the works to the ground will depend, to a great degree, the strength of the position.

The question as to how the extensive use of field-works on the battle-field will affect the field artillery of the future is one that cannot be overlooked. Different nations are attempting to solve this problem in different ways. By one the attempt is to be made to batter down the opposing works by the use of powerful artillery with heavy firing charges. The disadvantages of this are, first, in case of rifle-pits and works of slight profile the target is so small that a large percentage of the shots are misses; while if the works are such as to offer a comparatively large mark, they are so strong that the fire has very little effect on them.

Another nation is experimenting with heavy bursting charges of a powerful explosive in the shell itself, the bursting charge being so strong that fragments of the shell are driven back in the direction of the firing point, thus reaching the men behind the parapet. By this method time fuses will have to be used and the fuse accurately bored to obtain satisfactory results.

Time shrapnel, with its great searching power, is the most effective except against overhead cover.

There is also a tendency toward the use of high angle fire from field howitzers. Fire of this kind, where bomb-proofs are not provided, is very effective as well as very demoralizing.

Just what the field artillery of the future should be, experience alone can determine, but it is probable that a combination of the foregoing will be necessary, depending upon existing circumstances.

As field-works are now regarded as an essential element in all military operations, the question of a suitable intrenching tool and how it is to be carried is one of first importance. I think it may be assumed, without dispute, that some sort of light intrenching tool should be carried by the soldier on his person, in order that he may have it with him for use in every emergeney. Tools carried in wagons are liable to be out of reach when most needed, although it would of course be advisable to have heavier tools of

XUM

this kind for important works, when there was time for their construction.

Most of the European nations have adopted the Linneman spade, weighing but one and a half pounds, as the intrenching tool for the infantry, to be carried on the soldier's person. In our own service this question has not, as yet, by any means been satisfactorily answered.

There is no doubt that in future wars field-works will be extensively used, and as their true function becomes better known, mistakes made in their use in the past will be avoided in the future.

THE INDIAN SOLDIER.

By Lieutenant Z. B. VANCE, Jr., 11th U. S. Infantry.

IN discussing the adaptability of the Indian as a soldier, let us first consider his character. He is remarkably intelligent, has exceedingly clear ideas of justice, a very tenacious memory of wrong done him and a very poor memory of favors. In this last respect, at least, that is the way he manifests himself to the white man, whom he regards as his natural enemy and from whom he thinks he is entitled to everything he can get; but it is very probable that among themselves they have the same idea of gratitude as the white man. The Indian, when he is first brought in contact with the white man, exhibits himself just as God made him. He is the most natural being on earth. He does not try to conceal his vices and takes no credit to himself for his virtues, of which he has a good many. This last opinion would probably not be concurred in by the average Arizonian, but I expect he is a little prejudiced.

With my limited experience of the Indian, I have always found him peculiarly frank and honest in everything. He knows when he does wrong, is always perfectly willing to admit it and takes his punishment as a matter of course. Whenever any row or disturbance occurs among them there is never any difficulty in arriving at the facts of the case. The truth can generally be ascertained from the man at fault himself. It is only when a white man is involved that the investigation becomes complicated. He is not only honest in this respect but he has an exceedingly clear idea of the property rights of other people. Never since I have been serving with this Indian company*—nearly eight months—have I had a single case of theft to deal with. This is one side of his character.

On the other side he is indolent, improvident and I am afraid utterly unreliable. He has no ambition to better his condition and no amount of education seems to give it to him. He goes East to school and sees what education has brought the white man to; but he reaps very little benefit from it, and returns to

*The Indian Company at Fort Apache, Arizona.

his "G" string and indolent life with delight. Such benefit as he has derived from education soon disappears.

It is the same way with those who have enlisted in the army, none of them or very few of them have any idea of using it as a means of bettering their condition, of making it their profession. Now that the novelty has worn off, they find too much work attached to it, and most of them are anxious to get out. It is very probable that the majority of this company will take their discharges when their three years are up. They do not understand and probably will not until after they have been discharged, that they were better off than they have ever been before. They cannot look into the future. It is only the present they care for, and at present they have too much work to do. Indolence predominates over everything else in their character and no amount of training will remove it. And, indeed, under the circumstances, can we wonder at their desire to go out? Why should they learn a trade or adopt a profession, when they can return to their reservation and be supported in idleness by the Government for the rest of their lives? How few trades or professions there would be in this world if every man woman and child in them could draw a pound and a quarter of beef, and flour, coffee and sugar in proportion, daily, without working for it!

Let us consider next what an Indian has to learn according to present regulations before he can become a soldier. They are almost all taken from a savage state with little or no previous education. They therefore have to learn everything pertaining to civilized life, in addition to their military duties,—how to speak English, how to cook, how to eat, how to wash, how to take care of their clothes, and last of all how to drink beer without getting drunk.

This latter is the most difficult of all their duties. Besides requiring a high degree of civilization, it requires long and most diligent application, and a great many highly educated white men go through a variety of vicissitudes before they can learn it. But they wrestle with the problem manfully every pay day, and some of them have arrived at such a state of perfection as to be able to get through an inspection with as many as three bottles aboard. In regard to their other duties the great trouble is not in teaching them, for they are wonderfully bright and pick up everything with great rapidity, but in keeping them to a performance of their duties after they have learned them. To do

this they have yet to be constantly kept under the eye of a white man.

In speaking of their brightness I ought to add that this applies only when they are being taught their strictly military duties, in which they all take a lively interest. In teaching them duties which require much manual labor, such as scrubbing, cooking, etc., the gleam of intelligence dies out of their eyes and you have to deal practically with idiots.

The "Post Exchange System" is exceedingly bad for them; but still, while it is an authorized institution in the army, they cannot very well, with justice, be deprived of its privileges. If they are debarred from the Exchange and see white soldiers still enjoying its privileges, they feel that they are being discriminated against and it causes just discontent among them.

It was thought at first that the Exchange would to a certain extent keep them away from the "tizwin" camps, of which there are unavoidably a great many in this vicinity, but such has not been the case. "Tiswin," by the way, is an Indian intoxicant, and is simply the corn mash from which whiskey is distilled. They patronize the Exchange very freely, but when they have too much beer and are not allowed any more there, or their money gives out and they cannot buy any more, they can always find "tizwin," of which they can get unlimited quantities on credit.

It is to an Indian the most inexplicable thing in the world that the Government will furnish him with the means of getting drunk and then punish him for what he does when he is in that condition. This has been the most difficult thing to explain to them that I have undertaken since I have been with them. They considered at first that the fact that they were drunk when they committed an offense ought to be an ample excuse.

It is a great mistake to station Indian companies on, or in the vicinity of Indian reservations, where they are brought in contact with outside Indians. The comparison between the life of the soldiers and the free and easy life of the natives renders military restraint exceedingly irksome to the former, and greatly increases their desire to return to their former state of ease and dirt; so much so that it takes everlasting watching and the severest discipline to keep them up to all their duties.

To illustrate the effect this station has had upon them I will give one instance. About a month after the arrival of the com-

XUM

pany here, a corporal, a graduate of the Indian school at Carlisle and a man I had considered very reliable, suddenly disappeared. Upon investigation I found that military restraint here had been too much for him, and he had torn off his uniform, dressed himself in the native costume (shirt, "G" string and drawers) and with the expression "Heap work—me go," was last seen disappearing in the direction of his native heath.

They will not adapt themselves to the habits and customs of the white man (except in so far as they are absolutely compelled) as long as they are kept in their own country and surrounded by their own people. They ought to be sent East, where they would be removed from such influences. I might add here that this would not be considered a hardship by the officers in charge of them.

When this Indian company came to Fort Apache last September, none of its members had, since their enlistment sixteen months before, served near an Indian reservation. As a result they had adopted a good many of the white man's ways, and more particularly had learned to amuse themselves as the white soldiers did. They had become very fond of foot-ball, base-ball and games of that kind, and in general had become very well contented with the life they led in the post. At first they considered themselves immeasurably superior to the native Indians in every respect, and they would not affiliate with them at all. But "Tizwin" and the women finally brought them down to the level of the natives, and within a few months they were hand and glove with them. They no longer cared for amusements in the post, as they could find much more congenial diversions in the hills. This applies more especially to the Apache-speaking tribes in the company, viz.; the Tontos, San Carlos, and Coytero Indians. The Yumas and Mojaves, speaking an entirely different language from the natives, are not so much influenced by them. Their unmusical tongue not being understood by the women, is not appreciated by them, and they were thus removed from a great source of demoralization. The result of this is that the best behaved and most painstaking soldiers in the company are the Mojaves and Yumas, though I believe they are generally considered inferior in character to the first named tribes.

The most difficult task in the administration of an Indian company is the training of the non-commissioned officers. They are eager for the chevrons and there is great enthusiasm to obtain them,

XUM

but as yet, it has been impossible to imbue them with the proper idea of the responsibility attaching to them. They have not yet learned to control themselves and therefore cannot be expected to exercise much control over others. As soon as they are made non-commissioned officers and find that punishment is not dealt out to them so summarily as to privates, they are inclined to think that their stripes give them a greater license to get into devilment, and it is hard to make them understand that the pride of their rank should make them behave better than privates. The fact that this company is composed of five different tribes, with different interests and even speaking different languages, was at first the source of great difficulty in its management. Endless bickerings and disputes were constantly going on between the members of different tribes, and on pay day numerous black eyes and chewed up fingers were the result. But I am glad to say there has been a great improvement in this respect and they now have become pretty well amalgamated. Notwithstanding the drawbacks and influences noted above, I do not think there can be any doubt but these Indians have made rapid progress, and deserve just credit for it ; and I am sure no officer who has ever served with them can include them among the turbulent and disorderly Indian soldiers alluded to so often in the papers of late.

XUM

A PROPER ARTILLERY FIELD ARMAMENT.*

By Lieutenant WM. E. BIRKHIMER, Adjutant 3d U. S. Artillery.

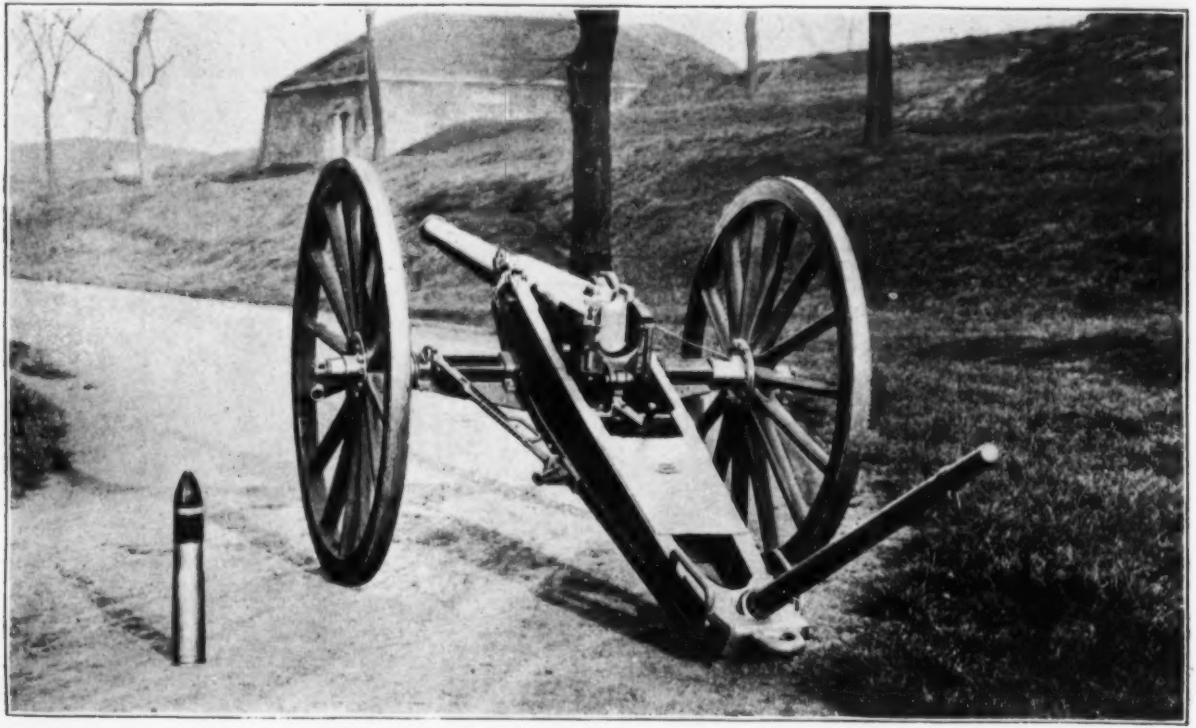
IN paragraph 1095, page 435, Artillery drill regulations, it is stated that the rôle of the machine-gun, on the battle-field, is not yet determined. This statement caused this paper to be written; not especially to demonstrate either the justness or the reverse of the assertion, but because, when read, it suggested the query "what, in fact, constitutes a proper field armament?"

At the threshold of our discussion of this subject, let attention be directed to one fact which apparently often is overlooked. It is this: An army cannot be made up of field artillery alone.

In the drill regulations, already referred to, it is stated that this arm has no independent rôle on the battle-field; that it acts in conjunction with other arms, its duty being to prepare and support.

As to this we may remark, in passing, that, as to independent rôle, the rule is equally true of the other arms. Now, what is the result of this? Plainly, that the number of field-pieces, whether guns, mitrailleuses, mortars or howitzers, that can accompany an army, is limited. All these various species of man or obstacle-destroying machines have merit, as such, in greater or less degree. Each, in fact, is peculiarly well adapted to particular positions or kinds of work afforded by the usual field of battle or campaign. If we could fight our battles with artillery alone we could wisely take into the field as many as we please of these various kinds of guns. But this we know is not practicable; in point of numbers, the artillery usually ranks third as an arm of service, so that, to begin with, we must bring ourselves to recognize the important fact that but a limited amount of artillery, with its attendant impedimenta, can be taken into the field. Bearing this in mind, the question which we essay to determine regarding a proper field-armament, becomes, not whether all the classes of guns, etc., before mentioned, may not be effective for the purposes indicated, and each particularly so in certain positions and under certain conditions; but, considering the fact that

*Read before the Post Lyceum, Washington Barracks, February 28, 1893.



THE HOTCHKISS 75 MM. RAPID FIRING GUN ON FIELD CARRIAGE.

only a limited number can be taken with the army, then which kinds and in what proportion shall we take them? That is the practical question. It is the question which the general commanding an army would ask us as artillery officers, were we taking the field. He reasonably would expect an intelligent answer. Now, the correct reply, it is submitted, is this: the field armament should be almost, if not wholly, made up of those guns, etc., which would be most *generally* useful, while the guns for special positions should be relatively small in number. For each of the latter taken along one of the former must be left behind: therefore, we must weigh well the consequences before we take any of them.

Under this rule how many machine-guns, if any, should be taken along, or rather, what proportion of machine-guns compared with others? That is an important question. It is not to be answered inconsiderately. We now will briefly consider it.

First, let us fix upon what a machine-gun is. For the purposes of this paper, it will be deemed to be a multi-barrelled machine, fired by means of a crank or similar device.

These guns are well known to the world. They occupy a conspicuous position in naval armaments. They have been quite extensively used by the military—the land forces—of various countries. As to their value, thus demonstrated, opinions have been widely different.

During the Rebellion the Requa battery, as it was called, was used at the siege of Fort Wagner. Considerable confidence seems to have been reposed in the battery—5 being used—yet they soon passed out of consideration.

The French brought the mitrailleuses into the field in 1870, and it seems they expected the guns would play an important part. They did not, however, and their failure has perhaps unjustly disparaged the machine-guns. But this failure must not be counted against the system for more than it is worth. The French mitrailleuse was, compared with machine-guns of the present day, a crude affair. It used paper cartridges, was clumsy to handle, consisting of twenty-five barrels arranged in five tiers of five barrels each, and, what was perhaps of as great importance, the army was not familiar enough with them to know how best to use them. They fired small-arm ammunition.

What would have been the result had these guns been pitted against a less thoroughly prepared army than the German, it is

XUM

impossible to state. But unfortunately for them the artillery of the latter nation had been worked up to a then surprising degree of perfection. It resulted that the mitrailleuses, as a rule, stood no chance against the German field guns. To avoid being crushed by the fire of the latter, the mitrailleuse had to be withdrawn. This is stated by the English General Walker, who accompanied the German army, and many other witnesses. And although isolated instances occurred when mitrailleuses did excellent service, the consensus of opinion was decidedly against them when opposed to the field-gun.

Subsequently to that period machine-guns have been vastly improved as man-killing machines. During this interval they have been widely used, though not extensively by any one army. Sir Garnet Wolseley used them in the Ashantee War of 1873; the Russians in the Khivan expedition; General Miles used Gatlings against the Indians in 1874; General Howard against the Nez Percés in 1877; both sides in the Turco-Russian War of 1877–78, when the experience of both parties was something like that of France in 1870–71; the English took machine guns to Zululand in 1879, where their performances were disappointing; they were used again by both sides in the Chilio-Peruvian war of 1881–82, and the Egyptian campaign of 1882. In all these and in other instances that might be cited, the machine-guns proved themselves invaluable in defensive positions where they were protected from the missiles of the assailing party; or against a mob as in Alexandria. But, except in the one case of the Turco-Russian war, the instances cited do not teach us much that is useful when fighting a well-organized foe. In the other instances, war was being waged against savages or semi-savages. Spite of this fact, however, and of the other pertinent fact that the machine-gun during these years had been perfected, apparently, in mechanism, it is doubtful if it stands much higher to-day in the estimation of military nations than at the close of the Franco-Prussian War.

It is necessary to probe beneath the surface to understand this fact. In all civilized countries, and some others as well, boards without number have sat to examine into the value of the machine-gun as a fighting machine. Targets, set up at long distances, have been riddled with bullets, and it seemed inevitable that, had troops occupied their places, they would have been annihilated.

Every board, those of our own army as well as others, has dwelt in its report upon the apparent man-killing, army exterminating power of these machines; and yet, notwithstanding all this, the governments who maintain first-class military organizations have not, to any extent, adopted them to accompany their field forces.

There must be a well-founded reason for this. What is it?

It may not be easy to answer that question correctly. Of one thing, however, we may rest assured, and it is this: that, for some reason, a deep seated conviction has taken possession of the enlightened military mind that machine-guns have not yet won for themselves a place in field armaments side by side with some other engines of destruction. So far as our own authorities are concerned, this feeling manifests itself in the statement, taken from our artillery drill regulations before quoted, that the rôle of the machine-gun on the battle-field is not yet determined.

In what respect, therefore, is the machine-gun apparently relatively weak, as compared with some more powerful competitor, and what is the latter? The answer as exhibited both on the proving-ground and the battle-field is that, at long ranges it is relatively inefficient as compared with the field-gun, which latter has demonstrated and maintained its superiority for general utility in campaign, and therefore is the favored weapon. In arriving at this conclusion, we must deal fairly with ourselves. In a matter of so great importance we must divest ourselves of predilections in favor of any particular system. We must face facts as they are. Napoleon the Third would not do this, and the disasters of the War of 1870–71 resulted. We admit that, in certain positions, particularly on the defensive, the machine-gun reigns the queen of the armament. We know that, if a battery of these guns can surprise our field-guns at close range, they might vanquish the latter; and, if the surprise were from the flank, the field-guns might be placed *hors-de-combat* instanter. But this narration of possible advantages unfolds the vital weakness of the system. To win, it is necessary that adventitious circumstances favor it, and this we cannot calculate upon. With an enterprising, able and vigilant enemy, we may safely calculate that we will gain no advantages except those won by fighting on nearly equal terms. The machine-gun goes forth to do battle conscious of a weakness which accident of position alone can cure; and this it will be the business of the enemy to see shall not be

given it. On the other hand, the field-gun system of the present day is conscious of its own strength, and the military nations, if we may judge from their actions, have confidence in it. If, in 1870–71, the field-gun either ignored the mitrailleuse or promptly destroyed or drove it off, so much more competent is it to do this now, notwithstanding all the improvement in machine-guns since. The effective range of the mitrailleuse has not been greatly increased, although its efficiency at all the ranges has been enhanced very much. With the field-gun the increase of power has been enormous. It shoots more accurately, its range is much greater, and the projectiles are delivered home with an effect formerly unknown. The development of power has gone on at equal pace in all its parts; the gun, the carriage, the powder, the projectile, the fuse. All that is wanted is competent gunners. These we must assume that we have. If we do not we will go to the wall, as did the French in 1870, should we meet an adversary that has them.

The outer zone of field-artillery fire-action as laid down in our drill regulations is from 3000 to 2000 yards from the enemy's position. Prince Kraft gives the outside effective shrapnel range as about 3500 yards or two miles, but 3000 is authority for us. At that range machine-guns produce no effect worth considering, nor at ranges considerably less. If brought into competition the field-gun would simply knock them to pieces. In 1870 the Germans used shells. These broke into about one-tenth of the death-missiles of the present shrapnel. And so destructive is the latter to animate objects that, if the opposing artilleries are equal in number of guns, that one which first gets the range correctly will be likely to destroy his opponent. For machine-guns to attempt to fight field-guns at ranges of 2000 yards or upwards would be suicidal. So much for the fight in the open.

But all know how the art of hasty cover has been developed and how extensively practiced during recent wars. Of what use is the machine-gun confronted with these? Of none at all. Even the Hotchkiss revolving cannon, the most powerful of all machine-guns, makes no impression on slight earth-works. And, as it seems likely that hasty and even more deliberately formed intrenchments will, when time permits, be even more generally used hereafter than heretofore, the machine-guns, in this aspect of the case, are destined to become of less importance and practical utility, relatively, to other parts of the field armament not thus

handicapped. It may be said, it is true, that as the machine-gun is so admirably fitted for defensive purposes, when protected by walls, parapets or other substantial cover, the army on the defensive may use it to great advantage. But to this it is replied that no nation can depend upon always having its army on the defensive. If so, it can make up its mind to be vanquished, in which case its machine-guns would avail it little.

Reasoning from these facts we reach the conclusion that, if a weapon is at hand which will be more *generally* useful than the machine-gun it, to the exclusion of the latter, properly will constitute our field armament. If we believe that such a weapon exists, and is turned out by our Ordnance Department, we conclude that the machine-gun wisely could not be taken into the field to the partial exclusion, as it would be, of the more generally useful field-gun.

The fact just mentioned of the increased importance of field-works and hasty intrenchments, and their being more generally resorted to now than before, has brought into prominence the great and increasing necessity that exists for a field armament which can cope with the new difficulty thence arising, namely, reaching an enemy sheltered by these works or at least driving him therefrom. Our drill regulations are silent upon this point, at least to the extent that no suggestion is contained therein that, possibly, a special kind of gun may be needed for the purpose indicated. Other nations, and particularly the Russians, are fully alive to the importance of the subject. Plevna taught them something. They there learned that the enemy's infantry, secure behind or under the defenses they had thrown up, temporary at first, but gradually assuming a more permanent character, could not be reached by any guns they had in the field. They have prepared to meet such difficulties in the future by field-howitzers and field-mortars, several batteries of which form part of the Russian artillery. This Plevna experience was precisely like ours before Petersburg in 1864–65, when we used large numbers of Coehorn mortars to reach the enemy protected by their substantial breastworks. Austria has adopted a 3.43-inch field-mortar; France a 3.54-inch; Germany a 3.46-inch; Italy a 3.42-inch; Russia a 6-inch; Switzerland a 4.72-inch; the United States a 3.6-inch. In France, Spain and Russia a 6-inch field-howitzer is favored, in Austria, Sweden and Switzerland a 4.7-inch, while Germany is intermediate. These facts show that the countries involved are alive to the importance of

XUM

taking along into the field a weapon that can search out a covered enemy.

The taking howitzers into the field is nothing new. Most of those present remember when our field-batteries were composed partly of guns and partly of howitzers. For instance, company "H," 3d artillery, when equipped as a light company in the valley of Mexico, had four twelve-pounder guns and 2 twenty-four-pounder howitzers; and E, same regiment, when it marched to the first Bull Run, had 2 twelve-pounder rifles, 2 twelve-pounder howitzers, and 2 six-pounder smooth bore guns. But the purpose of the new howitzer is totally different from that of the old. The latter was for ricochet effect, firing a heavy shell which was very effective against troops in the open or at short ranges. The newly adopted howitzers and mortars fire, it is true, very heavy projectiles for field artillery, but it is for the purpose of reaching not an open but a concealed foe. Moreover, no one has suggested that field-guns and howitzers now be mixed up in the same batteries as was formerly done. They cannot be made yoke-fellows in this way without impairing the utility of both. It only remains, therefore, if field-howitzers and mortars are to be used at all, that they be organized into separate batteries.

But the nations have not sprung with avidity to introduce field-howitzers and mortars as part of their armaments. There is nothing attractive looking about them. They do not have the air of a neat yet destructive toy, which apparently renders work with the machine gun so fascinating. The field-howitzer and mortar are the ill-visaged, unwelcome progeny of stern necessity. Their coming into the world has elbowed out of the way an equal number of the more presentable and favorite field-guns. But, unfortunately, the latter could not do the work which it was found absolutely necessary should be done, so the former, much as the fact is regretted, had to be resorted to. But besides the fact that the taking a field-howitzer or mortar into the field meant leaving a field-gun at home, other embarrassing questions arose regarding their management. It seems to be a generally received artillery tactical principle that field-artillery should move as close to the head of the columns as it can with any reasonable degree of safety, come early into action, and stay there until conclusions have been determined. Our drill regulations prescribe that the guns shall boldly and unhesitatingly approach within 3000 or 2500 yards of the enemy's artillery position, promptly find the

range, and commence the artillery duel. Now the howitzers and mortars are not suited for this kind of work. To be on the field at this stage of the game would be simply to have them in the way. If we confine our attention to this phase of the artillery situation we might naturally conclude that they should march somewhere in rear, so as not to interfere with the long-range gun, or the cavalry or infantry which are needed in their respective spheres of action in the first stages of the battle. But if they are kept back for this reason, what assurance have we that they will be on hand when needed?

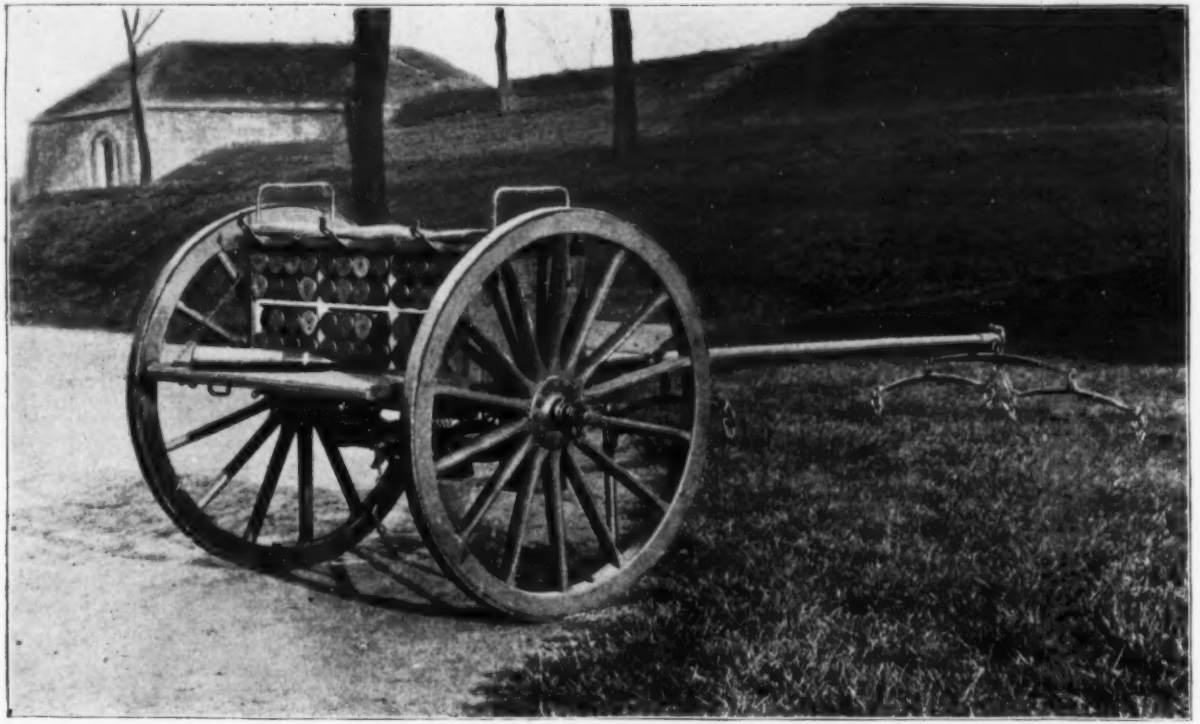
Considerations of this nature have prompted nations to strive to devise something which would obviate the necessity for these special armaments, of limited, though great and necessary utility. The great desideratum has been to get a general utility field-gun which can do the special work of the howitzers and mortars mentioned. At first sight this would seem impossible of attainment. It was simply because the field-gun could not do this that the howitzers and mortars exist. The trajectory of the former is flat, that of the latter curved; the excellence of the former is preëminent at long, that of the latter at short or relatively short range; the former is intended to destroy both animate and inanimate objects in plain view, though at a distance; the latter to supplement this work by searching out what is concealed.

Notwithstanding these facts, however, it really seems that, with the appearance of high explosives and their successful adaptation as bursters of field-gun projectiles, this machine can sucfully accomplish very nearly if not all that the curved-fire weapons were intended to do. Our Ordnance Department states that the use of such explosives in this way is successfully past the experimental stage. This seems to be in accord with the experiments of other countries. We cannot doubt but that it is true; and, if so, it will be a welcome fact to the military nations. It strikes the death-knell to any extensive field-howitzer and mortar system, even if it do not cause the latter to be wholly discarded. The field artillery system would thereby greatly be simplified. Two calibres of guns at most would be used, one for the horse the other for the field artillery. The former—3.2-inch—might take along some of the torpedo shells; but, as with us at least, it operates principally with the cavalry, the improved shrapnel would be its favorite missile. To the field artillery,—3.6-inch—will be given the task of driving the enemy from his cover or destroying the

latter by the torpedo shells. As a conclusion from these premises, the 3.2 and 3.6-inch guns will, of themselves, and unassisted by special weapons of any kind, constitute our true field armament; and, if the question were put to me officially, I would, for the reasons before given, so reply. This paper might stop here, but a few remarks regarding the trend of recent field armament improvements may not be deemed to be out of place.

The general statement truthfully can be made that improvements in small-arms and in artillery have gone on side by side, and almost at equal pace. Still, there exists in our 3.2-inch and 3.6-inch system nothing similar in principle to the magazine rifle. Can the artillery keep up with the march of infantry rifle improvement, in this regard, or will it be compelled to acknowledge, to this extent, its inherent inferiority? To understand this proposition it is necessary to appreciate the virtue of the magazine rifle. What, then, is its advantage over the single loader? simply this, that a number of shots may be stored up and launched forth at the critical moment of the contest. After this, and until time be taken to recharge the magazine, the rifle is nothing more than a single loader. It must be confessed that not only does our present field-gun system not contain the magazine principle, but in its present stage of development, it cannot even approximate to it. Now it may be said that there is no need of anything of that kind in the field-gun; that it can, as exemplified in our 3.2-inch and 3.6-inch pieces, fire with sufficient rapidity for all practical purposes; that power of projectile, accurately delivered, and not rapidity of fire with perhaps more or less inaccuracy, constitutes the element of superiority and crowning excellence of the field-gun. Unquestionably there is much that is true in this. To hit the right spot should ever be the first aim of the artillerist to which all other considerations are subsidiary. And yet it cannot be denied that if, without materially sacrificing the elements of power which characterize our present field-artillery system, we can at the same time by any convenient and practicable means increase its ability to deliver at the crisis of the conflict an intense and rapid fire like unto that of the magazine rifle, it were a consummation devoutly to be wished.

It is possible that we may have almost if not quite within our reach the field-gun that will do this. If so, it is found in the so-called quick-firing field guns similar to large numbers used in the navy and offered to the army. There are various



LIMBER FOR 75 MM. HOTCHKISS GUN.

styles of these. As a rule their projectiles are lighter than those of our field-guns, and therefore, confessedly, power, as regards each or any particular projectile, is sacrificed; but, on the other hand, the greater number of projectiles showered upon any spot in any given time covers it with a vastly greater amount of metallic and death-dealing fragments in the latter case than in the former. This is the great advantage claimed for the quick firing field-guns by their advocates. Mr. Nordenfelt and his agents, for instance, claim that, at long ranges, say 2500 or 3000 yards, they can deliver twelve aimed shots per gun per minute, the gun being laid properly after each shot. Now this may be so when the gun was in the hands of the owner and inventor on the practice ground; that such a record could be depended on in campaign, no one can reasonably expect. In spite of non-recoil carriages so-called, and all devices thus far invented to keep the gun exactly in its place after the first shot, Mr. Nordenfelt himself has stated that, at long ranges, to secure accurate firing, he found it necessary to lay the gun after each shot. This detracts considerably from the quick-firing feature of the system. On the other hand, the quick-firing principle of the magazine rifle is not to be utilized at long, but at short, or infantry ranges; and at artillery short-ranges the quick-firing field-guns are capable of delivering an almost continuous stream of projectiles. In this respect it seems to be the counterpart, in the artillery, of the magazine rifle; but the difficulties attendant upon its perfection have not, as yet, been so satisfactorily solved as in the case of the latter.

The difficulty which, above all others, seems to confront the quick-firing gun lies in the want of ability promptly and effectually to take up the recoil of the carriage. It is claimed indeed that this has been overcome; but it is not believed that this is absolutely true. However, this is a question of mechanical skill that, it is conceived, will not prove impossible of solution in the near future. But recently the great military nations have been armed with the magazine infantry weapon before mentioned. The attendant expense has been a severe drain upon their moneyed resources. They are not just now prepared to incur the additional expense which would result from an extensive change in the field-gun armament, such as the improvements developed since these armaments were adopted suggest as being advisable. As, however, the single loader was abandoned for the magazine rifle, so,

it is believed, is the advance in field armaments to a higher plane inevitable in the not very distant future. If signs are not amiss the direction which modifications of the present field armament will take will be the quick-firing guns. Let one of the great military nations but make the break away from present armaments, and the rest, just as was the case with the magazine rifle, will have to follow. When the quick-firing guns are adopted, if they be adopted, the machine guns will be still further relegated to the rear of an army taking the field.

Since writing what precedes I have received from Paris, through the courtesy of General Albert Ordway, the agent of the Hotchkiss Company, photographs of a quick-firing gun of this system, which I hereby present for inspection. I do not propose to appear here as the advocate of this or any other special system of field artillery to the exclusion of others; but, taken in connection with what I have already stated on the subject, the details of this system are of great interest.

In point of mobility it is about equal to the 3.2-inch battery stationed at this post, equipped, like the Hotchkiss, as horse artillery. Shell, shrapnel and case are used, so constructed as to give a large number of effective missiles. Smokeless powder only is used. The fuse, combination time and percussion, is almost exactly like our so-called Frankford. Eight aimed shots per gun at the longer, and fifteen shots per gun at the shorter unaimed ranges can be delivered each minute. Recoil is, theoretically, almost obliterated, and wholly so, after the first round or two, by means of a powerful trail-spade. Another feature is that the caisson consists of two carriages exactly like the gun-limber, save that the rear one of the caissons is fitted with a movable stock instead of a pole. I confess that, for horse artillery, this system seems to me nearly perfection. It uses metallic ammunition, the cartridge case of aluminium, the projectile weighing 13.2 pounds against the 13.5 pounds of our light gun. If the Hotchkiss gun can successfully accomplish what is claimed for it, it may be called the magazine field-gun. To me the weakest feature of all seems to be the trail-spade device for taking up recoil. Under any other except favorable conditions of soil, its successful working is at least matter for doubt.

XUM

NOTES ON PERSONAL EQUIPMENT OF OFFICERS IN THE FIELD.

By Lieutenant W. C. BROWN, 1st U. S. Cavalry.

WHILE on the winter campaign of 1890–91, as well as during various practice marches since that time, I became impressed by the fact that I found no two officers equipped exactly alike, and observed also in strolling through camp that some new idea presented itself in almost every tent. By diligently calling upon my neighbors and noting the best point in the field equipment of each, I was thus enabled to collect many ideas for the improvement of my own.

The following thoughts are thus accordingly presented, not that I expect to offer much that is new, but rather that I may excite discussion and that new ideas may thereby be developed.

All officers will doubtless agree that during active operations in the field, officers and men alike should limit themselves to those articles which are absolutely essential to health, comfort and an efficient performance of military duty.

The officer who loads down his wagons with heavy and bulky luxuries, commits not only the fault of taking up more than his proper share of the allotted transportation, but sets a bad example to the men; and if they, taking the cue from their officers, likewise indulge themselves in needless comforts and luxuries, the evil effects are multiplied, and will be apparent, not only in overloaded transportation, but in the time required to get started on the march in the morning, as all such articles require in their packing more or less of the time and attention of the owner—whether officer or private—at the busiest hour of the day, viz., between reveille and the time the march is sounded.

If the officer takes with him every luxury which can be carried on wheels, but restricts his men to the barest necessities, dissatisfaction in the ranks is sure to result; besides it should be the pride of every officer to share with his men the hardships incident to an active campaign.

Enlisted men may, and do frequently fail to give due weight to the superior mental acquirements of their officers, but they

never fail to appreciate fine physical qualities, powers of endurance, and an apparent indifference to the fatigues and discomforts of field service.

As a rule the harder the campaign and the more limited the transportation, the more nearly, within certain limits, will the equipment of the officers approach to that of the men. In outfitting for the field there are two extremes to be guarded against; if too much be taken there is great danger of overloading the transportation alluded to above, in which case vexatious delays are sure to occur; while on the other hand nothing in the matter of equipment should be left behind which materially adds to an officer's effective performance of duty. It will be one of the objects of this paper to point out how the field outfit may be provided with every reasonable comfort, at a moderate expense, and yet its bulk and weight be small enough to avoid unfavorable comment and criticism.

It is most important that the commanding officer, whatever his grade, should be in prime physical condition. Let him be even slightly indisposed, and the marches, if he can make them so, are too frequently short ones. If in the day's march there are two camping places ahead, one at twenty miles, the other at twenty-five, it has been noticed that the command usually camps at the former, no matter how fresh and vigorous every other individual in the command may be. So important is this that experience has demonstrated that, within reasonable limits, officers must be allowed more comforts than can be given to the men.

A cavalry officer should have two horses, both well-gaited. A fresh horse is then always at his disposal on arriving in camp, and this is not infrequently needed. A badly-gaited horse not only worries, frets, and tries the temper of his rider, but, if ridden by the commanding officer, affects the entire command, for with such an animal a steady, even gait for the command is an impossibility.

Bedding.—It is of the first importance after a hard day's march to get a comfortable night's rest, not only as a preparation for the fatigues of the following day but with an eye to preventing future sick leaves and early retirement.

It is in this important item of the field outfit that wide differences are noted. Captain Gouty will be provided with a stout heavy camp bed and with a hair or cotton mattrass, feather pillow,

blankets and comfortables galore, while 2d Lieutenant Johnny-Come-Lately, fresh from the Point, prides himself on showing how he can "rough it" with little more than his saddle blanket and overcoat, stretched beside the camp-fire. Both are wrong. The former for taking the field with an outfit which is twice as heavy and bulky as it should be, while his would-be "tough and hardy" subaltern will be howling with rheumatism long before he gets his double bars, unless he provides himself with means of sleeping warmly and comfortably while in the field.

A mattrass or cot of some kind is indispensable, unless in the timber where pine boughs are available.

I have used an air mattrass for some years but find it only fairly good, being somewhat hard and uncomfortable. While it occupies but little more space in the bedding roll than a government blanket, it weighs fourteen pounds,—as much as a portable camp bed which I have found to be more comfortable and less expensive. In extremely cold weather the air bed is considered the warmer, simply because the bed is made on the ground. In all other situations the light folding camp bed is preferred.

The most useful article of bedding which an officer can carry, is a sleeping bag, and in describing its advantages I can do no better, than to quote from the author of "Camping and Camp Outfits," who says:

"The best camp bed for all times and circumstances is the sleeping bag. I would as soon think of going into the woods without my rifle as without my sleeping bag. Beside being water-proof, it is wind-proof, and one can sleep as soundly and almost as comfortably in a snow-drift on the prairie as in a tent or a house. In short, he may be absolutely at home and comfortable wherever night finds him, and no matter what horrid night mare he may have, he cannot roll out of bed or kick off the covers. Nor will he catch a draft of cold air along the edge of his spine every time he turns over, as he is liable to do when sleeping in blankets. Nor will his feet crawl out from under the cover and catch chilblains, as they are liable to do in the old-fashioned way. In fact, this sleeping bag is one of the greatest luxuries I ever took into camp and too much cannot be said in its favor."

The Arctic sleeping bags are made of fur and are much warmer and much lighter than those made of sheepskin.

The inside sack should be of canton flannel or soft flannel. It may then be laundried when opportunity occurs.

XUM

In cold weather an eider-down quilt placed in the sleeping bag has been found to be a most valuable addition. With these, I have slept comfortably in camp when the temperature was 32° below zero. The covering of the quilt should, however, be of such a texture as not to allow the down to sift through it.

An air pillow makes a fair substitute for a feather one. It is a little hard, but by placing it underneath the sheepskin lining of the bag, or by placing inside the dark flannel pillow-case a sort of feather pad like a section from an eider-down quilt, a very fair head-rest may be obtained.

The air pillow weighs less than a pound and its bulk is inappreciable. The ordinary feather pillow weighs three pounds or over. A pillow half this size, would, however, be quite ample for field use, but it would still weigh more than the rubber one and be much more bulky.

Those of us who are growing bald before our time, will find a light-weight black silk travelling cap a most useful article. This, when not in use, should be stuffed in the pillow case, or somewhere about the head of the sleeping bag.

The case containing toilet articles, etc., I would have to button on the inner side of the lower part of the sleeping bag, about under the pillow or a little above it. In permanent camp it may be removed and placed where most convenient.

One secret of sleeping warm and comfortably with a moderate amount of bedding, lies in making good use of the outer clothing, saddle blanket, saddle cloth, etc.; the saddle-blanket and saddle-cloth, both well dried out, should usually be placed under the bedding proper. The blouse, slicker or overcoat, especially the Miles' overcoat, are useful as top covering.

The bedding should always be rolled in canvas of some kind. For this, two pieces of shelter-tent, buttoned together, do very well except when marching through dense timber with pack animals; in such situations it is rather light and tears too easily when caught on branches of trees.

Two pieces of shelter-tent weigh about 3½ lbs., and give a spread of about 5x10 feet of canvas,—large enough for a tent in case of emergency, and always large enough to place underneath the bed and allow a flap to come over the top. A wall tent fly, sometimes used for this purpose, cannot be recommended, as it weighs no less than 15 lbs.,—all out of proportion to its heat retaining properties when used as bedding.

Overcoat.—As a garment for field service, too much cannot be said in favor of the Miles' overcoat. It is not stylish but it is far more comfortable and serviceable than either the uniform overcoat for officers or that for enlisted men. The outer material being of canvas resists rain, and being furnished with a cape—which by a drawstring can be converted into a hood—it is just the thing for cold, windy weather. By loosening a couple of drawstrings it is instantly converted into a bed cover nearly as large as a government blanket and two pounds heavier. There are holes at the arm pits through which to run a surcingle when necessity requires its use as a horse cover.

Next to a Miles' overcoat in point of general utility for summer use, is a pommel "slicker" which is strong, impervious to wind or rain, and so cheap that one can afford to give it away when occasion demands it.

Footwear.—The Thompson boot for field use has many advocates, and it certainly is far superior to either the regulation boot worn by officers or that worn by the men. Stout shoes with canvas leggings seem however to be more in favor at present, particularly for mountain climbing.

For several months past I have worn on my field shoes a pair of jointed aluminum soles, which thus far are quite satisfactory and promise to be of great protection when working in the mountains and in rocky country generally.

A pair of moccasins with heavy soles and high flaps should be carried for use about camp. In extremely cold weather boots and shoes may well be discarded and replaced by felt boots or German socks with arctic overshoes.

Cook Stoves.—A good cook should be able to get along without any stove whatever, but a stove is such a great convenience that where transportation is abundant, and the command likely to lay by in camp for a considerable time, it is well to carry one. The ordinary sheet iron affair with an oven has the disadvantage of being bulky, and requires a crate which is frequently as heavy as the stove itself. Probably the best and most compact stove for a mess of three officers is a 2-hole stove, without bottom and with detachable sides, all made of sheet iron, with stove lids riveted to the top with a single rivet so that the lid is turned aside rather than lifted off the stove.

To this should be added five or six joints of telescopic pipe, which I have found to work well. A pair of pliers will be found

convenient in pulling apart the joints of pipe in unpacking. A stove similar to the above, except that it includes an oven, has recently been patented.

Mess Outfit.—For plates, cups, etc., ordinary tinware is probably the best that can be used. Granite ware is more attractive to eat from and more easily cleaned, but has the disadvantage of being much heavier than tin. Cups should flare somewhat, and have the lower ends of their handles free so that the cups will "nest" readily. Frying pans should be provided with handles having a hinge at the end nearest the pan so as to fold in packing. Aluminum cooking utensils have passed the experimental stage, and are now being regularly manufactured. From my experience with them they seem preferable to iron or steel cooking utensils, on account of lightness and the ease with which they are kept clean. A folding rubber bucket will be found a valuable addition to the mess outfit.

Field Glass.—No officer can afford to be without a good field glass, and one mounted in aluminum is preferred. The French artillery glass has the advantage of being the most compact one made, but lacks somewhat in power. During the past ten years I have used the pocket army glass made by Bardon & Co., and especially recommended by our Signal Service to officers of the army. It is a remarkably good glass, of convenient shape, not expensive, but with its brass mounting is a little heavy. A more powerful glass than either of the above is the Binocular Telescope, which combines the great power of a telescope with all the field of view that one needs under ordinary circumstances. Part of the focusing is done by a sliding joint and the remainder by the usual screw.

Map.—A copy of the best map obtainable should always be carried, and this should be "blue printed" on linen.

A Compass of course should not be forgotten, and the propriety of having one with an illuminated face is suggested for use in travelling on cloudy nights.

Spurs.—The regulation spurs, both for officers and men, are heavier than necessary; clumsy and apt to pinch the heel. Where so comfortable and serviceable a spur as the Mills' pattern can be had for 94 cents per pair, no reason is seen why they should not be adopted for both officers and men. I have used these spurs for three or four years and find them preferable in every way to the heavier regulation spur.

REMARKS UPON THE ORGANIZATION OF THE ARMIES OF EUROPE.

THE FRENCH ARMY.

By Captain J. J. O'CONNELL, 1st U. S. Infantry.

IF a young officer of our army were asked what epoch of the past he would most gladly summon back so as to live in it, he would choose well in reviving the reign of Napoleon and making himself an officer in the Imperial Army. To those who read the history of the French army during the ten sparkling years between 1804 and 1814,—when the great emperor enriched Paris with the spoils of Europe and distributed crowns and coronets, batons, estates and even high-born brides among his victorious soldiers,—it would seem as if the excitement of being a French officer must have been so intense as to keep the nerves in constant thrill. A single act of bravery on the field of battle was sure to bring a man under the notice of the great soldier, and to win honors at his hand was the acme of a soldier's ambition. This was the spirit of the rank and file of the French army of the past, the spirit that animated the twenty-six marshals of Napoleon, most of whom won their batons on the field of battle.

It is a debatable question in the minds of prominent military critics, whether the officers of the Napoleonic era,—who were little given to books and to the theory of war deducible from them, but who were close observers of practical warfare and essentially men of action,—were not more effective leaders than are the French officers of to day, who are very much preoccupied with book preparation for war. Future battles will alone decide the question.

What is the spirit, the motive power, that dominates the French army of to-day? An earnest purpose to regain in Europe the commanding military position, forfeited to Germany twenty-three years ago through a series of mortifying defeats, originating in a total lack of preparation, utterly defective mobilization, and a fallacious estimate of its own and its enemy's strength. This, with a firm determination to repossess the conquered provinces of Alsace and Lorraine, which are thoroughly French, if two-

XUM

hundred years can nationalize a people, is the spirit that actuates the army of republican France.

The War of 1870–71 thoroughly humbled French military pride and abundantly demonstrated the glaring defects of the French military system, and the government, immediately on the reëstablishment of peace, began the work, an herculean task, of reconstructing its army on the principles of that of the victor. The whole fabric was put on a new basis, the recruiting system was changed, effectives of cadres increased, administration reformed, artillery material transformed, infantry and cavalry improved, new systems of drill regulations and of instruction were adopted, the frontier rendered open by treaty must be defended by a new network of forts, and large supplies of war material, arms, clothing, equipment, food and forage must be stored. All this was done with the most praiseworthy activity, the parliament voting the necessary appropriations for reëstablishing the military greatness of France with an alacrity that was ratified by the unanimous voice of the people.

France has not swerved an iota during these twenty-three years, from its one grand purpose,—the creation of an army inferior to none in Europe. Whether she has succeeded, the not remote future will show. The tenacity of purpose and the unanimity and cheerfulness with which the government has supplied the required funds, is a matter of wonder and admiration to the world. Governments may change, revolution succeed revolution, and pandemonium reign in *le beau Paris* and in the turbulent legislative assembly, but the army is not affected by them. The millions are promptly appropriated just the same without a dissenting voice, and the one object on which all parties, radically opposite though they be on other matters, are unanimous, is never lost sight of. The same spirit of activity, unanimity and zeal pervades every department of the the army and is visible in the private as in the captain; in the colonel as in the general.

The War of 1870 left France helpless, and to complete her ruin, besides dismemberment an enormous war indemnity of one billion of dollars was levied on her, Germany hoping thereby to render her powerless for future aggression and to reduce her to a second-class power. The annexation of Alsace and Lorraine was a political blunder on the part of Bismarck, for it has not strengthened Germany but is rather a source of weakness to her, due to the introduction of a foreign and inimical element into her

politics. It has perpetuated a cause for contention and friction which at any moment may make Europe one large battle-field. Both countries recognize the fact that their interests personally and commercially would be better promoted by friendly relations, which are prevented by this stumbling block of irritation on the side of the French.

No man was more astonished than Bismarck at the promptitude and self-sacrifice of the French people in paying off the terrible debt imposed upon them. It was totally unexpected. In spite of all, the young republic waxed in vigor to such an alarming extent that the German War Office became anxious. It viewed with exasperation the rapid strides to national prosperity and military power, and resolved at once to crush the rising republic. The plans for the complete destruction and dismemberment of France were fully worked out by von Moltke, and all that was wanted was the assent of Russia. The latter power, not out of love for republican France, but moved by the policy of self-preservation, cried "hands off," the plans were pigeon-holed and the threatened blow averted.

France continued to grow stronger and stronger, until the military supremacy of Germany was threatened. A temporary solution of the difficulty was obtained by the passage of the Septinate Bill, whereby the numerical strength of the German army was considerably increased. But this did not suffice to keep abreast of French progress and the Dreibund became a necessity. The need of Germany for an offensive and defensive alliance with Austria and Italy was very flattering to France, as it presented to the world the most convincing proof of the perfection and strength of her military organization. But this device against the now fully established military power of France, contained within itself the elements of disintegration, in the form of internal dissensions and the oppressive taxation necessary to maintain colossal armies. In Germany the war tax per capita is 30 marks, in France, 78. In Italy, a much less productive country than either of her allies, 44, and in Austria, 56.

The French army has cost France, from 1871 to 1893, over three thousand millions of dollars ($3,000,000,000) and the appropriation for 1893–94 is $117,000,000. It is a heavy burden, but France bears it without a murmur, and lightly in comparison with the way in which her neighbors, who are by no means as wealthy as she, stagger under theirs.

XUM

In Germany, Austria and Italy, taxation for military purposes has been carried on to such an extent that the limit of forbearance of the people, if not already reached, soon will be, and a terrible crisis will surely follow. Austria and Italy feel they are committing political suicide in maintaining this alliance, and give signs of distress which are heeded in Berlin.

Europe presents a wonderful spectacle at the present time. She claims a sort of monopoly of civilization, yet every nation has reached the limit of its endurance in preparing for war, which nevertheless does not arrive. The surplus energy and money of the continent is devoted to keeping up a security which is nowhere felt, but which is guaranteed by profuse professions of peaceable intentions. The work of civilization goes on, every day records some advance in science or in human comfort, and yet the nations with one consent are converting themselves into food for powder, and have agreed that they must sleep in plate armor.

The present condition cannot go on much longer, nor can it become much worse, for men and money are alike exhausted. There is not a statesman in Europe who could draw up, much less successfully carry out, a plan of general disarmament. It is questionable if there is a nation in Europe which would consent to be disarmed. That is surely not a triumph of human wisdom, and yet the nations are not more furious than usual, are not unreasonable, are not even indisposed to work through the methods of diplomacy. Still they lie down in armor with improved magazine rifles in hand ready for the conflict, and before beginning the day's labor anxiously and cautiously watch what their armed burglar neighbor may be at. What the end may be we will let the future decide—it is impossible to forecast it at the present writing.

The young war-lord of the German Empire, recognizing the signs of the times and the inherent weakness of the Dreibund, has cast around for the solution of his difficult position, for a means to make himself independent of his allies, and the Caprivi bill is the result—another confession of the splendid condition of the French military machine, and of the lack of confidence in the strength and stability of the Dreibund. The peace effective of the German army, as fixed by the Huene Compromise to the Caprivi bill, consists of an annual average of 479,229 privates and corporals divided as follows:

538 battalions of infantry,

173 half battalions of infantry,
465 troops of cavalry,
494 batteries of artillery (field),
37 batteries of fortress artillery,
23 battalions of pioneers,
7 battalions of R. R. troops,
21 battalions of train troops.

This number does not include officers and sergeants, nor military employés, who are determined annually by the appropriation bill.

The above strength of the army takes effect on the 1st of October of this year and will be the standard until March 31st, 1894. It does not include one-year volunteers. The service is for three years in cavalry and horse artillery, two years in the other arms. It is practically adding 70,000 annually to the present strength of the army.

The new law involves an expenditure of 66,800,000 marks in a lump sum, and of this 61,000,000 was to have appeared in the Budget for 1893 and 1894. When the system is thoroughly developed, Germany will have 4,400,000 soldiers at her command in time of war. The 60 batteries of increase by this bill have each four guns,—the others have six.

Under the present system of recruitment France has reached very nearly the limit of greatest possible increase, which will bring her fighting strength in 1900 to about 4,350,000 men. The population of France is nearly 38,500,000, and is almost at a stand-still; while that of Germany, Russia, Austria and Italy, are vigorously on the increase, numbering at present respectively 49, 110, 42 and 28 millions. France must therefore necessarily cease competition in this direction, and already there is a disposition even to reduce the cavalry and artillery to their former status under the law of 1875. She considers her armed force large enough for any emergency, and believes the main factors of success in future warfare will be, as they have been in the past, simple and quick mobilization, rapid concentration, the ability of the commander-in-chief and general officers, the perfection of its arm and its use, and largely in the *morale* of the rank and file. She realizes that a small number of troops has often accomplished more than large masses, and that one obtains more from the quality of the army than from its quantity. Her attention is, therefore, directed to the material rather than to the magnitude

of her army. The mobilization of the army is regulated to the smallest minutia, such that in case of war, a dispatch of three words sent throughout France, would suffice to put the whole army *en route*, each cadre knowing in advance its part in the programme.

The concentration, a matter totally distinct, is carefully regulated in the same manner, but the plan is kept secret. The Superior Council of War is charged with the plans of mobilization and concentration. General Ferron,—late chief of the General Staff,—is the author of the present system of mobilization.

I witnessed the last 14th of July review at Longchamps. The troops consisted of the military government of Paris reënforced by a brigade of reserves, numbering in all 18,000 men. The troops of the active army were commanded by the Minister of War, General Loizillon, and the brigade of reserves by General Saussier.

The troops began their march at a fixed hour from their respective barracks in the vicinity of Paris, so as to have an hour's rest and a cold lunch in the shady alleys of the famous race-course before debouching and forming line. At the sound of trumpets carried along from right to left, the various units began their march preparatory to forming line, and not a halt or a single instance of blocking was noticed from the moment they debouched until line was formed,—a remarkable exhibition of precision and promptitude.

At 2.45 P. M. the review was formed in two grand lines, the first occupied by the troops of the active army and military schools, the second by a brigade of infantry reserves, regular artillery and reserve, a division of cavalry preceded by a troop from St. Cyr and one from the Republican Guard. The different arms were formed as follows: infantry in close column of battalions, regiments 30 paces apart,—artillery, batteries massed at 30 paces interval between groups,—cavalry, each brigade in column of masses. The infantry passed the tribune in close column of battalions, artillery by battery at a trot—interval 3 paces, cavalry by troop at a gallop at full distance, its artillery at same gait by battery at close interval.

My position while the troops passed in review did not afford me a fair opportunity to judge of the marching and bearing of the men, and I therefore cannot intelligently criticise the movements.

Having left the hippodrome of Longchamps the troops marched to their respective barracks, passing through the principal boulevards and affording me an excellent opportunity to review them from the steps of the Madelaine.

At the head of the column rides the accomplished soldier—General Saussier—who is evidently a popular favorite, judging from the plaudits that greet him on every side.

The infantry come next into view in column of platoons. They are not very impressive looking, they march carelessly, the platoon fronts look ragged, the men are short of stature and insignificant in appearance, their clothes do not fit them and hang loosely, they look untidy yet wiry and active. They do not compare favorably with the tall, strapping looking fellows I saw in London and Berlin. Yet French infantry, such men as these, have done wonderful feats of daring, and they possess more of the initiative quality than either the English or Germans. Such are the men that won the victories of Marengo, Jena, and Austerlitz. They only need a leader. They would not, by any manner of means, compare well with the veterans I saw march down Pennsylvania Avenue on the 23d day of May, 1865.

Now comes the dashing and brilliant arm of the service—the light artillery. The batteries are in superb condition, supplied with guns of the latest model, the horses, harness and carriages are highly serviceable and creditable. Its condition is the result of long and patient effort. The artillery is cheered to the echo.

The cavalry now passes in review and presents a very fine military appearance. The troopers are much larger than the men of the infantry, the horses are in excellent condition, and both show the effects of careful and persistent training. They seem to be worthy representatives of that gallant body of horsemen which performed imperishable deeds of heroism when led by Murat, Kellermann and Lasalle.

In conclusion, I was very favorably impressed with the military bearing of the cavalry and artillery cadres, but not so with the foot regiments. Their general attitude was slouchy and the marching loose and uneven, but then French infantry was never noted for precision in drill or marching, rather for the contrary; indeed, it ridicules the parade step of its neighbor across the border, and fully believes and trusts in Napoleon's aphorism in relation to battle, "Fire is everything, the rest amounts to little," which may account in part for its looseness in drill formations.

XUM

The French, unlike the Germans, are not a military people, but are steadily becoming so. Discipline is irksome to them, nor do they readily submit to the restrictions of army life. They are eminently a liberty loving, impulsive and brave people, to whom the restraints of barrack life are irritating and repellant. French discipline is different from that of its neighbor. Its character is different. What suits the one would not suit the other, and the strict discipline of the Germans would be entirely out of place in France. After all, essentially, discipline is embraced in one word—obedience, and the French sample is perhaps as good as the German, at least what the French soldier renders he does cheerfully and not stolidly.

There is a fashion among a certain class of people of speaking of the French race and civilization as degenerate and corrupt. Nothing can be farther from the truth. This opinion they deduce from the French light literature of the day, which they say reflects French life and civilization. According to them France pays the penalty of its sins in having a degenerate manhood, which they say is evidenced in the smaller stature of the French soldiery. These assertions are based on false premises, for French light literature is usually an index of Parisian life, which is made up of the corrupt output of all other nations, but not of French life; for Paris is not France, no more than cosmopolitan New York is the United States. France pays no more penalty for the sins of its capital than do other nations. This class of people forget the fact that all sinners being birds of a feather, flock to *le beau Paris* and make it the headquarters of their terrestrial paradise. It is a historical fact that the men of the Paris contingent in the army have always been among the very best in the service.

There are two very celebrated military academies in Paris, the Polytechnic and St. Cyr. The former is a military and scientific institution which imparts, among other subjects, a thorough knowledge of mathematics and physics. Students are prepared for the artillery, engineers and staff corps. The course in each lasts two years. Admission is from the age of 16 to 20, and by competitive examination. Candidates must have the degree of bachelor of science or literature before presenting themselves for preliminary examination. German and English are taught and special attention is devoted to the French language throughout the entire course.

St. Cyr, named after one of Napoleon's marshals, Gouvion, who assumed the name after his elevation in rank, is a preparatory school for the officers of infantry and cavalry. It is less theoretical and scientific than the Polytechnic but more practical. The courses in the two schools differ inasmuch as that of the one begins where that of the other ends.

The grade of instruction at St. Cyr corresponds very nearly to that imparted at the West Point Military Academy in the fourth and first half of the third classes, completing analytical geometry. The higher mathematics are not considered essential, either in Paris or Berlin, to the attainments that make up a good cavalry or infantry officer. It may be taken for granted that neither Ney or Murat on the one side, nor Blücher or Seydlitz on the other, nor a host of other famous horsemen and infantrymen knew anything of the vagaries of "Wave Motion."

The Polytechnic is the nursery of *les armes savants*, artillery, engineers and general staff, and its curriculum is very much like that of our own Military Academy during the third and fourth years. There are usually about a thousand cadets attending these academies, none of whom are "found" for intellectual deficiency.

Admission to the "War College," or superior school of war, is by competition, and the entrance examination consists of written and oral questions on the complete circle of military knowledge, and a trial of horsemanship. Lieutenants and captains of all arms of the service are admissible for examination who shall have served at least five years, three of which with the colors. Officers who have failed three times in the examination are no longer admissible. Over 500 officers passed this year the entrance examination to this renowned school.

General Miribel,—head of the general staff—has done much for the army in promoting intellectual activity. In this he has been ably supported by the late Minister of War,—de Freycinet,—who was compelled by public opinion to retire to private life, on account of having been even slightly acquainted with Hertz, the Mephistopheles of the Panama scandal. The smallest suspicion of dishonorable conduct will not be tolerated in officials connected with the administration of the army. De Freycinet devoted his great abilities for five years, with marked success, to the mental and physical development of the army of his country. His successor—General Loizillon—zealously continues the work marked out by him.

The necessity of practical and theoretical instruction is fully appreciated by all grades in the army, and every inducement is offered to secure both, to the fullest extent. Every garrison has its school for officers and non-commissioned officers, presided over by competent officers, where good work is performed and not merely schoolboy recitations.

In France, the lyceum system is a reality, not a farce. The routine work is frequently enlivened by lectures on military topics by officers thoroughly conversant with the science and art of war, and the lectures become afterwards the subjects of intelligent discussion. The other military schools in France are:

The War College, Paris.

School of Application for Artillery and Engineers, Fontainebleau.

School of Application for Cavalry, Saumur.

" " for Infantry, Saint Maixent.*

" " of Powder and Saltpetre, Paris.

" " of Medicine and Pharmacy, Paris.

National School of Forestry, Nancy.

School of Military Hygiene, Lyons.

" " Administration, Vincennes.

" of Gymnastics and Fencing, Joinville-le-Pont.

Normal School of Gunnery, Camp of Châlons.

At La Flèche is the famous Prytanée, where young boys, sons of soldiers and non-commissioned officers, are prepared for the army.

There is an excellently appointed artillery and engineers school at Versailles, situated between the Avenue of Paris and that of the Grand Army, fronting the palace.

The Avenue of Paris is not only the widest (100 yards), but one of the finest in the world. It was through this magnificent avenue that the German Guard Corps made its triumphal march at the close of the War of 1870, as the *coup-de-grace* to the humiliation of the French nation.

Last July while in Paris I visited the *Ecole Superieure de Guerre*, situated in the rear of what was once the *Champs de Mars*, but now *le Place de l'Exposition*. There is a large number of first lieutenants, intended for the general staff, attending this school. I was greatly impressed with the completeness and simplicity of

* 400 Sergeants have been detailed this year to the Infantry School of Application at St Maixent, for a course of two years' study, with an officer's commission in view.

its appointments, and at the absence of all luxury. It appeared very evident that hard work was the rule at this institution. The officers are quartered in the city, and report daily to the commandant. In the spacious hall of the building hangs a list, containing the names, residence, and telephonic communication of every officer in the establishment, so that he may be communicated with at once in case his services are needed. Adjacent to the college are barracks for a regiment of cavalry and infantry.

I noticed, in passing, that the sentinels on duty conducted themselves in a listless and nonchalant manner, and were not averse to holding snatches of conversation with the *bonnes* that loitered about,—a breach of discipline that would not be tolerated for an instant at the Horse Guards in London, or at the Brandenburg Gate at Berlin. But then the French soldier is noticeably lax in these, to him, minor points of discipline, which his neighbors value so highly.

On the parade ground of one of these barracks I witnessed a drill that was quite a novelty to me,—a drill in the art of self-defense. The instructor seemed of the opinion that it was not all-sufficient to secure efficiency with a rifle at long range, but that the company should be proficient with their own arms at short range. The company, in double ranks, was marched to the drill-ground, halted, and distance taken to the front as with us for bayonet exercise. The instructor commands, "*en garde*," at which the men assume a position similar to that taken by our men at "Guard,"—arms in the attitude of boxing. Then follow a series of commands for blows aimed at thorax and head, and corresponding parries. Thus the art of attack and defense is taught, and besides acquiring useful knowledge the men are exercised in the very best way for strengthening and rendering supple the muscles of every part of the body.

At the celebrated Fortress of Vincennes is a school for gymnastics and musketry, where the best marksmen in the army receive their instruction. Great attention is given here to marksmanship, the rifle and its use, and the French soldier is taught to believe that in the next war the intelligent and accurate use of his weapon will play an important part. The *chasseurs de Vincennes*,—a body of crack riflemen,—are garrisoned at this place.

The officers of the city of Paris and its vicinity, numbering about 5000, assemble for pleasure, instruction and good fellowship, at their military club, "le Cercle Militaire," in a stately man-

sion in the Avenue de l'Opera. All officers of the army and navy are eligible for membership. It is the largest military club in existence, being much larger in membership than that of Berlin, Vienna, London, or St. Petersburg. The military commander of Paris is *ex-officio* its president, and the President of the Republic and high state officials are usually active or honorary members. The rooms are handsomely and tastefully furnished. There is a large common room, or parlor, where the members meet socially. Another spacious apartment is occupied by a carefully selected library, well supplied with ancient and modern works on professional subjects, and the principal papers and periodicals of the day in French, German, English and Italian. A music hall for concerts, which occur frequently; a gymnasium, with all modern appliances; sleeping apartments for permanent and transient members, and a splendid mess hall, where meals are served in the very best style and for the least possible outlay—a godsend to lieutenants who have no other income than their forty dollars a month salary. The club contains a large and artistically decorated assembly room, in which the members meet weekly for lectures and discussions in which they actively take part. The attendance at these professional disquisitions, which form a prominent feature of the institution, is usually large and enthusiastic, political topics being strictly ignored. Attached to this successfully managed club is a printing-office whence issues weekly *Le Revue au Cercle Militaire*, devoted to the affairs of the institution and military topics.

We no longer look to Germany for the origination or elucidation of military ideas, or, as has been the fashion, consider her the fountain head, from which all nations imbibe the principles of the art and science of war. The scene has changed from Berlin to Paris. There are many excellent writers among the officers of the French army who, besides writing standard military works, contribute to the following periodicals, *L'Avenir Militaire*, *Le Progrés Militaire*, *La France Militaire*, *Journal des Sciences Militaire*, and to the periodically published reviews of the different arms of the service. Among the writers we find Generals Ferron, Pierron, Bonie, Lewal, Girard, and a large number of colonels and officers of lesser grade.

Our generals and colonels have no time for writing, for they seem to be fully occupied in unravelling the mysteries of what appears to be the paper age of our professional existence, inflicted

by the administrative departments of the army. The graduates of our Military Academy are as clever, to say the least, as those of the Polytecnic, St. Cyr, Woolwich, Sandhurst, or Lichterfelde, but there is this difference; when our young officers doff the gray and don the blue, their intellectual energies are too frequently abruptly terminated, whereas those of the others continue to be strengthened and developed, as a result of the lively emulation and constant competition for promotion and selection to higher rank, which with them depends on professional proficiency, and which, in the few instances occurring in our army, is too often apt to be a mere personal matter.

CORPS OF OFFICERS.

A republican form of government is not compatible with a large and powerful standing army. France, surrounded on every side by enemies, is compelled to maintain one for self-existence. Monarchy on the other hand, and a large and powerful standing army, are corelative matters. The one is absolutely essential to the existence of the other. An army thrives better under a permanent war lord, whose life and that of his empire depend upon it, than under a changeable commander or secretary of war, whose term of office depends on political scheming. Under the former condition nothing is left undone that human power is capable of, to render the military machine as perfect as possible in all its parts. Under the latter, political ascendency assumes the form of patriotism, and is the first consideration; the army, the last.

This is generally true as to republics but is not applicable to the Republic of France, for the army has been its first and absorbing consideration during the last 23 years.

In the sense of stability, the German imperial military machine seems to have a decided advantage over its republican rival. Democracy has its advantages, but they are hardly visible in the maintenance and management of an efficient army, in which the principle of centralization is a *sine qua non* of its perfection and rational development, but directly antagonistic to democratic principles. The oft repeated platitudes "We are all born free," and, "one man is as good as another," which we have in a government by the people but not for the people, but rather for a few political aristocrats, are mere twaddle, the contrary being true out of the army, and especially true in it, where rank is everything and man nothing.

The pernicious effects of these fallacies are but too frequently felt in armies or republican governments. Equality and fraternity have no more place in a republican army than they have in a monarchical.

Our first and most aristocratic President, and we have not improved upon him, laid down the following principles to the Secretary of War—"Take only gentlemen for officers"—hence the old form of dress-parade "Gentlemen and officers to the front, march." This is as it ought to be. The man should be fit for his vocation, the vocation not descend to the man. The profession of arms being the most honorable, only gentlemen should be commissioned officers.

The principle of promotion in the army of our sister republic is in a great measure different from ours, and much more democratic. Every soldier is encouraged to believe he carries a commission in his knapsack, and hence the preponderance of the promotions come from the ranks. This system worked well in the time of Napoleon and his marshals, many of whom could hardly read or write. New conditions, however, have arisen since that time to meet which successfully, a high grade of intelligence in the corps of officers is absolutely essential.

There are 23,300 officers in the French army, and the creation of such a large corps of officers is a matter of grave consideration, especially when it is considered that many of them are more ornamental than useful. They cannot all be actually employed, but they are held in readiness in case the reserves or second line is mobilized. A less numerous corps, in which all would perform actual service, would seem preferable.

The register of the French army for 1893 gives the following number of officers in the active army—2 marshals, 102 generals of division, 198 generals of brigade, 419 colonels, 465 lieut-colonels, 2011 majors, 7881 captains and 12,238 lieutenants—a total of 23,316 which includes officers of the Gendarmerie and Train. The officers of the reserves number 14,540 and the territorial army is officered by 17,119, making a grand total of 54,975 officers. The law adopted in July by the Senate fixed the number of generals of brigade at 220 and that of general of division at 110.

There are many officers in command who are known to be incompetent, but in deference to former gallant service they are retained in positions which would be better filled by younger men with resulting greater efficiency of the army. Modern warfare

will demand iron discipline and the highest *morale* from men in the ranks. Will officers promoted in this manner be able to maintain or call forth these qualities, and command the respect and enthusiasm usually inspired by men of high principles and refined associations? The weight of opinion is to the contrary.

Many of Napoleon's generals were men of this class, but they were very highly gifted, men who could command and create armies and wrest victory out of seeming defeat. Besides, what was practicable at the beginning of the 19th century is not quite so at its close. These were men of action, not of books, whose one impulse was to fight,—to attack the enemy whenever and wherever they could find him without losing much time with preliminaries. They had a fitting antagonist in Blücher—nicknamed "Marshal Forwarts,"—of whom Napoleon said in praise "Le vieux diable m'a toujours attaque avec le même vigueur; s'il etait battu, un instant après il se rencontrait prêt pour le combat."

But nowadays we require something more than action. The times demand intelligently directed action, which seemingly requires a thorough military training. This necessity is fully recognized by French military authorities, and everything is being done to promote and develop the military education of its officers.

French officers have not the *entrée* into the best society by virtue of their commissions. Admission requires social standing and personal acceptability independent of military rank. The contrary is true of German officers, for they are largely graduates of the Central Military Academy at Lichterfelde, the cadets of which are in great part the sons of officers or of citizens who have rendered distinguished service to the state, and sons of the nobility. Thus the German corps of officers constitutes a caste, in contradistinction to that of her republican neighbor.

One-half of the commissions in the line and one-third of those in the scientific corps are given to non-commissioned officers, who seldom rise above the rank of battalion commander. The remaining commissions in the line and appointments to the staff are given to the graduates of the two military academies according to their standing at graduation, which standing is not affected by that variable quantity called "discipline."

Applicants for admission to these academies must be well up in their studies, for at the military schools no attempt is made at imparting general education, in fact a boy must have a thor-

ough education before he is admitted to either. As the admission is by competition, there is a strong rivalry among undergraduates of colleges for these appointments, for success means an honorable if not lucrative position for life. Those who pass the ordeal of the preliminary examination, which is conducted with the utmost impartiality, are placed according to merit in the infantry school of St. Cyr, or in the celebrated Polytechnic. From the former the most intelligent pupils pass to the staff school, and after a very thorough course there to the *Etat Majeur;* the others are commissioned subalterns in the cavalry and infantry and take a practical course at schools of application. The first fifty graduates of the Polytechnic usually select civil employment; those next in intellectual merit choose the artillery and engineers and pass through a technical course at their respective schools of application. The graduates of lower standing either take subordinate civil appointments, commissions in the line of the army, or return to civil life.

Promotion throughout the army is by seniority, and by selection for gallant service or distinguished ability. Up to the rank of major promotion is preceded by an examination.

Considering the large number of officers in Paris and its vicinity, one is struck at the rarity with which they are met during the day. The fact is that French officers are too busily occupied with all sorts of subjects connected with their profession and have little time for flirting on the beautiful Champs Elysée or loafing in *cafés chantants.* What with hours of daily military drill, exercises in the gymnasium and attendance at the various military schools, and the conscientious performance of other military duty, their day is completely filled up and few indeed are seen in the streets.

French officers in the next war will not be found napping as many of them were in 1870, when German officers knew the roads and by-lanes of their country even better than themselves. Military geography and topography now form an important study in which every officer must be thoroughly proficient. Officers do not confine their studies to their own particular arm of the service, but they aim to become conversant with the other arms as well, for they believe that the best united effect of all cannot be obtained without a thorough knowledge of each.

The ability of French general officers is admitted by German military men, even to the extent of equality with their own, but

they do not admit that the French junior officers are the equals in standing and professional attainments of their younger officers. Even this concession is much for a German, and I have heard it freely expressed in Berlin. Unquestionably the superiority was overwhelmingly in favor of the German leaders in 1870. There has been a radical change since then, not that the Germans have degenerated, but that the French have made extraordinary progress since that humiliating epoch in their military life.

The following are a few of the prominent officers of the French army of to-day.

General Loizillon—present Minister of War—is considered an able cavalry officer. He commanded the 1st Army Corps at Lille, an important strategic position on the Belgian frontier, when called to his present responsible office.

General Saussier is regarded as the ablest general in the army. He is universally popular, and although 65 years of age is yet quite active. He has had a checkered experience during his long career, having served in the Crimea, Algeria, and Mexico under Bazaine, and commanded a regiment in the Franco-Prussian War. In 1878 he commanded the Nancy Division—the crack one of the army—now ably commanded by General Hervé. In 1881 he commanded the Tunis expedition, and became governor of Paris in 1884. Having attained the age of retirement he has been continued in the service by special act of President Carnot, who rarely exercises this power, and only when the interests of the State necessitate it. In case of war he would command the army, having already been designated for that position. Usually the commander-in-chief is selected by the council of war on the declaration of hostilities, and not before.

General de Galliffet is a cavalry officer of undoubted ability. He is a master of the combined tactics of the three arms, and has for many years virtually commanded the cavalry of France. He has received, in common with General Saussier, the highest distinction that his country can bestow since the abolishment of the rank of marshal—the military medal. He is a member of the council of war.

General Zurlinder,—commander of the artillery of Paris and its environment,—is a young officer of distinction and likely to become one of the future generals of armies. He is an Alsatian and graduate of the Polytechnic. He performed gallant and meritorious service in the War of 1870.

XUM

General Davoust is a very able man and served with distinction as colonel of a regiment at Metz, and afterwards became governor of Lyons.

General de Negrier, 50 years old, and youngest of all the division generals, is essentially a fighter. He comes of a distinguished military family, his grandfather and father being at present generals in the French army. He was severely wounded at Metz, escaped, was captured, and again made his escape. He served in the north of France under Faidherbe, where he was twice wounded. After the cessation of hostilities he served in Africa and the East, where he was again wounded. His promotion has been deservedly rapid and he is regarded as one of the division generals who will be selected to command an army.

Generals Saussier, Zurlinder and de Negrier, made their escape from German captivity in 1870.

Generals Jamont and Billot are able corps commanders and members of the council of war. Generals Brault, Hervé, Ferron and Berge, are officers of well merited reputation and are universally acknowledged to be very efficient commanders.

The pay of the lower grades of the French army officers is small in comparison with ours, while the higher grades are as well paid, if not a little better. A second lieutenant receives $40 a month, and a colonel only a little in excess of that of our captains of twenty years' service. It is not to be understood that all French officers live on their monthly stipend, for the corps of officers is partly composed of the sons of the old nobility and of wealthy men of France. This is true especially of the cavalry regiments, which contain the flower of the youth of France. The cavalry is the crack branch of the service. A sous-lieutenant who has only his forty dollars a month to live on, must be very careful in his economies to live at all, much less to make an acceptable appearance on occasions of ceremony. Many prefer to take their meals with the company, and thereby save money and be better prepared for swell occasions. On that salary, dissipation is out of the question.

Promotion is the all-absorbing question among French officers, and as it is partly by selection, is the source of great competition and much jealousy, and explains the anomalous standing of many officers.

The average age of the graduates of the milltary academies is twenty, when they are commissioned second lieutenants. A boy

of sixteen can enlist for five years, and after passing a required examination at the end of that term, be commissioned a second lieutenant. Every regiment has a regimental school, and every facility is offered for study and consequent promotion to a lieutenancy.

A lieutenant becomes a captain when he is about 30 or 35, serves in that grade from 10 to 14 years, becomes a *chef-de-battalion*, or major, between the ages of 40 and 44, lieutenant-colonel when he is 45 or 48, and colonel at about the age of 50. There is an age limit for retirements in the various grades, and when the officer reaches this he is retired and pensioned unless he is continued in service by special act, which is seldom done and only in the highest grades and for the best of reasons.

The retirement age for the following grades are:—Captain, 44; major, 52; lieutenant-colonel, 54; colonel, 58; general of brigade, 62; general of division, 65. There are 220 generals of brigade and 110 generals of division, and among the latter are included the seven generals allowed in peace and ten in war times.

Notwithstanding the age limit system, the vagaries and inequalities in promotion are a constant cause of discontent. The great difference in the number and rank of officers in the several branches of the service is another subject of complaint. The following list explains itself and exhibits the disproportion fully:—

	Infantry.	Cavalry.	Artillery.	Engineers.
Colonels	197	89	88	38
Lt.-Colonels	240	86	105	41
Majors	1227	295	445	156
Captains	4593	1072	1874	518
Lieutenants	6323	2117	2000	276

The proportions of the above grades in the different arms, taking the highest grade as a unit, are:—

	Colonel.	Lt.-Col.	Major.	Captain.	Lieutenant.
Infantry	1	1.2	6	23	32
Cavalry	1	1.1	3.3	12	23.8
Artillery	1	1.2	5	21.3	22.7
Engineers	1	1.1	4	14	7

Unfortunately, general officers are selected too much on account of personal and political influence,—a consequence of the system of government,—a method unknown in Berlin, where

ability and character are the co-efficients of success in promotion to the higher grades of command.

General Staff.—The necessity for a General Staff is obvious. War is becoming daily more scientific, plans of campaigns and their execution are reduced to a precision unknown in the past, armies require the highest administrative ability to move them and their supplies, intricate railway systems and innumerable wagons have to be handled, enormous masses of men and horses are to be fed and kept in condition for actual combat, and battles must be fought to which the above are merely subordinate.

A general must be conversant with all details and have his army perfectly in hand, much more so now than when armies were much smaller in numbers. A good general must be omniscient as well as ubiquitous, but as this is impossible in one man, he is obliged to have at his headquarters a number of co-adjutors,—subordinate officers,—staff officers,—aides-de-camp,—who have been carefully trained in strategy, grand and minor tactics, modern languages, military geography and history, and in the administrative departments. This class of officers is produced by the Staff College, and with them a general becomes as omniscient and ubiquitous in his particular sphere of action as a mortal can be.

Staff corps, in the sense of our organization, do not exist in the French service. There is an Etat Major,—General Staff,—the members of which are masters of the science and art of war. Officers of marked ability are selected from the army and the graduates of the Polytechnic and St. Cyr, according to their mental attainments, and are detailed for a two years' course in the Staff College in Paris. Those who pass satisfactory examinations at the end of the term are graduated members of the Etat Major, and are attached to the different regiments and organizations as the Minister of War may direct. They become the chiefs of staff to general officers, and the adjutants of other military bodies. They are not immediately connected with the administration of the temporalities of the army, which are managed by the Intendance and Department of Control, which correspond to the Control Department of the English service and the Quartermaster and Commissary Departments of our own. Captains and field officers of all arms of the service, on application, may be examined for admission to the staff, who have served seven years as officers, of which three at least must be with

troops. The examination is similar to that required of students of the War College at the termination of the two years' term in that institution. It demands a very thorough knowledge of the whole circle of military knowledge.

The artillery, into which is merged what in our service is known as the Ordnance Department, is responsible for the supply and distribution of ammunition to the different commands. The duties of officers of the Administrative departments, though different from those performed by officers of the Etat Major, are equally essential to the perfect condition of the military machine, for it is as necessary to know how to feed and clothe it, as to fight it.

The administrative departments are, with one or two minor exceptions, completely subordinate to the general commanding. The officers of the Control Department of the French army form therefore a very important branch of the General Staff, and are officers of the staff, if not strictly speaking, staff officers. The officers of the Adjutant-General's Department of our army are staff officers in the sense of Etat Major, without the rigid preliminary preparation, which is a *sine qua non* for promotion to that corps in foreign service.

Each regiment of infantry, cavalry and artillery has two captains who can serve until they are 60, whose duties are to attend to the clothing and payment of the regiments, besides the twelve captains of the first class and eleven of the second class. Every regiment has its surgeon-major and assistant surgeon, and one of the recent reforms introduced is the separation of the Intendance and Medical departments, thereby securing the complete autonomy of the Health Department.

OFFICERS' UNIFORM.

On the 7th of last February a change in the uniform of infantry officers was ordered. Artillery officers are expecting a similar change. The change was greeted with pleasure by some and viewed with disfavor by others, as it was the tenth change in fifteen years. The Dolman or hussar jacket and blouse are to be replaced with a dress coat of dark blue material with one row of buttons in front. The long discarded epaulets come again into favor on occasions of ceremony, but are never to be worn under the cape. The jacket was considered too heavy, and too hard to keep in order on account of its multiplicity of braid, and the

blouse, though comfortable, was deemed unmilitary in appearance and therefore could not be used on gala occasions. The dress coat is the only garment used, for it is thought to be too expensive to have two different uniforms for officers. To make this change as light as possible on officers of restricted means, the War Office decreed that it shall not take place for dress occasions until the 1st of January, 1894, and that the dolman and blouse may be worn on ordinary duty until January 1, 1896.

The jacket or blouse just discarded on account of the difficulty of keeping it presentable, is very much like the new braided article just adopted by our War Department.

The officers of the Reserves and Territorial army may wear the uniform of their brothers of the standing army if they wish, otherwise they continue indefinitely the use of the blouse and dolman.

The rank of officers is indicated by gold or silver stripes of a certain width, slightly separated from each other, which are worn on the sleeve:—one for a second lieutenant; two for a first lieutenant; three for a captain; four, major; five, lieutenant-colonel and colonel. The epaulets of general officers have short bright spiral fringes, while those worn by the Staff are long and flat. Captains, lieutenant-colonels and colonels have the epaulets alike on both shoulders, and the other officers have one fringed on one shoulder and unfringed on the other. The second lieutenant has unfringed on the left, the first lieutenant and major have unfringed on the right shoulder. General officers wear a double-breasted dress-coat, of dark blue cloth with dark blue stripes, or, in full dress, white trousers with long boots. The rank is shown by silver stars on the cuffs and epaulets; three for a general, two for a general of division, and one for a general of brigade.

(*To be continued.*)

Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that, as far as practicable, these "Comments" should appear under authors' names.)

I.

"Recruiting and Desertion."

Colonel T. M. Anderson, 14th U. S. Infantry.

I THINK it is Sainte Beuve who says that writers must either improvise or compose. In giving my impressions of your last number, I must improvise rather than analyze, from the very short time at my disposal.

Yet if military methods are to be reduced to something like an exact science, mere generalizations are a waste of time. Possibly the best thing a writer burdened with many duties can do, is to give his own experience.

As to recruiting, I submit that the first and most important thing for a recruiting officer to do, is to get the sympathy and confidence of the community in which he is to operate. Individual solicitation amounts to little, but if you can popularize the service, excellent men will be glad to enlist with you.

After the first campaign of the Rebellion I enlisted a full company in Ohio in a very short time. I canvassed several counties with a Baptist preacher, making speeches and distributing hand-bills at country churches and voting precincts. I do not think my hard-shell friend and myself agreed about anything in the heavens above or the earth beneath except about the one thing of enlisting men for the war, he for the volunteers and I for the regulars. I went with him to sewing circles and Dorcas societies, and drank as much poor tea and heard as much gossip as any man ever did in the same length of time, but I enlisted one hundred and three native born Americans for the 12th Infantry. There is no need of this kind of effort now, yet it is just as important now as then to keep touch with the people. For the last five years the 14th Infantry has been kept full to its limit by regimental recruiting. This has been done in this sparsely settled country by the method I have suggested.

It is a great advantage to a recruiting officer to belong to patriotic societies, such as the Loyal Legion, the Sons of the American Revolution, and the Grand Army. It brings him in contact with public spirited men. He should cultivate the militia and the press. He should make himself solid with civil officers and get acquainted with the jurymen who come in to quarter-sessions. A Grand Army camp fire may not be very exhilarating, yet the recruiting officer should attend. If the old boys want a speech he must talk to them. If the sisters of the Woman's Relief Corps ask him to take a ration of pork and beans, he must step up smiling. Their sons and brothers will be his best recruits.

Desertions will probably continue in all armies until the advocates of moral suasion succeed in reforming human nature.

So long as boys play hookey and young men are subject to feminine fascinations,

so long as men drink, gamble and make debts, so long will soldiers and sailors desert.

We all know three eminent army philanthropists who have been in times past apostles of moral reform. Far be it from us to say their labors have been futile, but two of them at least have turned their altruistic endeavors in other directions. The third I met lately in St. Paul at the Loyal Legion Congress. Years agone I had known him as a military missionary preaching on street corners. When in the midst of frivolous songs at a social meeting I heard him call on the Missouri Commandery for "The Frodigal Son," I thought that at last we would have something sacred and serious. But the Missouri version was something startling, for by it the returning prodigal sued his father and good brother for the profits of the ranch which had accrued in his absence. "That was the kind of prod—*he was.*" This is mentioned to show the sad failure of rose water as a moral prophylactic.

There are of course more serious considerations connected with this subject. The lighter sentences lately imposed for desertion and other military offenses seem to be given on the theory that such derelictions are merely violations of a contract. The fact that a citizen of a republic owes a military duty to his country as binding as that of a conscript under a monarchy, seems to have been ignored. Voluntary enlistment is a concession in place of conscription.

No class of soldiers should be subjected to harsh treatment, yet it seems undeniable that both officers and men should be placed under a discipline firm enough to develop in them a habit of obedience.

II.

"Army Organization."

Lieut.-Col. W. R. King, U. S. Corps of Engineers.

THE recent essay on Army Organization printed in the September number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION, by Capt. E. L. Zalinski, evinces much thoughtful study of the subject and makes many ingenious suggestions for the improvement of things military, which it is hoped will make profitable texts for the consideration of those who have control of such matters, as well as of officers and others more immediately concerned in improving the existing order of things.

Almost any intelligent and patriotic citizen will accept the dictum of Washington that "In time of peace we should prepare for war," but when it comes to adopting practical measures for carrying out this policy we not only find divided councils, but meet with strenuous opposition to any rational proceedings in that direction or in fact to anything tending to improve our military status. The most common reason for this opposition, aside from the question of cost, is the statement that our nation is so powerful that no other power will ever dare to attack us. It matters not that this argument has been used over and over again and the theory acted on to such an extent that every war in which we have been engaged has been fought at a great disadvantage and when we were least prepared for it, causing the loss of thousands of lives and millions of dollars, to show the folly of such theories. The obvious lessons of our many disasters, such as the capture of Washington in 1814 and the Battle of Bull Run, remain unlearned or are soon forgotten.

The question suggests itself, "Is it worth while to study over the subject of improving our military organization when there is hardly a possibility that any steps will be taken to carry out even the most simple and obvious plans, at least for many years to

come, or until our financial prospects shall have greatly improved?" The present outlook is certainly discouraging to the average military enthusiast, and he who makes suggestions of any practical value must "count the cost" and consider what the lawmakers will be likely to approve, for it would be idle at this time to discuss improvements that would involve any great addition to the military budget, however desirable they might otherwise appear.

These facts seem to have been kept in view by Captain Zalinski, for many of his most useful suggestions, such as the introduction of military drill into our public schools, the offering of prizes for marksmanship in the National Guard, the thorough enrollment of citizens of military ages, and the annual instruction of part of the National Guard in artillery drill at our military posts, would be quite inexpensive. The suggestion for the slow but gradual increase of the regular army is exactly in line with the recommendation of the writer in an essay written in 1884 and is certainly a reasonable proposition, but one not likely to be adopted under present circumstances. The method proposed for increasing the army in case of war is also in line with that suggested in the essay already referred to, as is also the plan for using reduced calibres in target practice with heavy guns to save ammunition; and to the latter might be added the practice of mortar firing with small charges and wooden projectiles, which gives very satisfactory results at short ranges, and gives practice at range finding and pointing the mortars, while the projectiles being lighter than the water can be picked up and used over and over again.

The details proposed by the author for the reorganization of the army can hardly be discussed in the space and time available to the present writer, but they are certainly worthy of careful study and many of them will doubtless be indorsed by competent judges of such matters. Speaking for that part with which I am most familiar, I can fully indorse the proposition to give the battalion of engineers a regimental organization, and I know of no army in any civilized country where such an organization would be deemed an excessive allowance for that arm of service.

The Captain's "Range Finder" is a little out of adjustment in one instance, if we may judge from his remarks on the desirability of having the artillery represented on boards appointed to fix the armament of forts, etc., for this has been the custom "since the memory of man runneth not to the contrary." All the armaments that we have in our forts were adopted by mixed boards on which the artillery was represented, and no one will doubt that it is well represented on the board now charged with the expenditure of many millions of dollars appropriated during the past few years for remodeling our Sea Coast Defenses.

Captain Zalinski's suggestions for reviving interest in rifle practice are timely, and it is hoped that something may yet be done to elevate marksmanship, at least to the level of a contest of sluggers for the possession of a football.

It is a disgrace to our national taste for amusement that our great daily journals, which are filled with the most minute details of horse races, ball games and other equally edifying "sports," which are but other names for the most reckless gambling, often contain not even a passing allusion to the annual rifle competition of the army. The money and time spent in witnessing these races and games, which are most demoralizing in their effects, would provide the United States with an army of sharpshooters that would be invincible in any emergency.

Brevt. Maj.-Gen. Wager Swayne, U. S. Army.

I have carefully read Captain Zalinski's article on Army Organization, in the September number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION. It is an admirable and comprehensive statement of the great need this country has for in-

creased military preparation and of how best it can be met. His suggestions in detail strongly commend themselves, and I wish every one of them could be carried out forthwith.

Major-Gen. Samuel Dalton, Adjutant-General, State of Mass.

I have read with much interest the able and instructive paper on "Army Organization" by Captain E. L. Zalinski, 5th U. S. Artillery, as published in the JOURNAL OF THE MILITARY SERVICE INSTITUTION, for September.

Captain Zalinski's remarks upon the duty of the general government to the militia of the country, meet my hearty commendation, showing as he does, that without the fostering care of the Government through the enactments of the Congress, it must remain in its present state of incompleteness indefinitely.

Captain Zalinski, from his experience in the army and his knowledge of the militia, is able to point out understandingly the needs as well as the weaknesses of both. He has given the subject much thought and, so far as my limited study of the matter goes, points out the weakness of our means of defense, and outlines an organization apparently well adapted to our needs.

Lieut.-Col. A. D. Cutler, Div. Inspector, N. G. California.

The ground covered by Captain Zalinski is so extensive and exhaustive, that it is hardly fair to criticise the few objectionable ideas where there are so many to be commended.

Page 927.—It would not be possible to make military training compulsory in private schools. Such training in public schools should be limited to the high schools, or those of an equivalent grade. To maintain such training in the grammar or primary grades would be too much to undertake for many years to come.

Page 928.—No pupils should be placed under non-commissioned officers. If commissioned officers cannot be spared, let the instruction be that of retired officers of the army or proficient civilians. No extra compensation should be paid to army officers for such duties. If instruction is given by others, their compensation should be that ordinarily paid for such duties.

We do not believe in competitive drills of any character, or in medals, except as a reward for bravery in the field. Our National Guard in particular, and our army to a certain extent, are armored with such to-day altogether too much. A board of officers to attend drills, seems unnecessary. One or two at least would be ample.

Page 929.—Annual encampments are well enough, except that so long as boys attend schools regularly for 40 weeks, their parents and friends expect their vacations to be spent in the neighborhood of their homes, and it is very likely that most boys consider such encampments something of a hardship, especially after the first year. It will not do to make military duties at all subservient to educational or home discipline.

Page 931.—We cannot help commending especially the statements regarding our wants as to officers of the grade of captain and lieutenant during the Civil War, and their lack of original knowledge of most of their duties referred to, especially in the Quartermaster and Commissary Departments.

We can see no particular need of educating students in the elements of intrenchments and reconnaissance, which must of necessity take a great deal of time and yet give results so crude as to be of little value.

Page 933.—We commend especially the promise of commissions in the army to the *élite* of college graduates. We do not understand that the course at West Point is too extensive or too short. If our youth cannot secure the proper results during four of

the best years of their lives, little can be expected of them thereafter, and the quicker such conclusion is arrived at, the better for all concerned.

Page 934.—We cannot favor making two grades, either of entrance or graduation, as it does not appear that either our times or needs are ripe enough for so radical a change. So far as cadets wasting their time or energies on study or duties that do not interest them, it is not possible to decide what results may come out of a cadet's later experience, and it is fair to presume that he will fall into occasional locations or conditions in active service where he is more than likely to need any or all the experience of the regular and usual course at the Academy. No one will deny that he is more than likely to be thrown into such positions during an ordinary term of service.

Page 935.—We recommend strongly additional appointments by the Senators and the President. We must however deprecate the plan of allowing graduates, low in the scale of proficiency, to graduate without commissions, as no one would know where to draw the line, and there would be no end of trouble therefrom. A similar confusion would result from there being cadets who pay for their tuition and support. This would be too much like the English system of commissions by purchase.

Page 938.—The apportionment named,—that is, by Congressional districts,—seems reasonable and convenient, also the details of such enrollment, particularly by the utilizing of officers on the retired list. We could not, however, advocate that garrison duty be performed by physically disqualified men, as it is not necessary to call on such for lack of numbers of the other class. The organization and equipment of invalids should never be undertaken except under the most adverse circumstances.

It is an open question whether military enrollment had better be made a condition of the right of suffrage. The latter is guaranteed by the Constitution and we do not think could be abrogated by any condition.

Page 939.—We would condemn the filling of calls for troops by volunteers except from the organized National Guard. After these are exhausted, then begin with the conscription at once. With all due regard and respect to our volunteers during the Civil War, the quicker a country gets right down to business by actual conscription, the better the chance for officers to make the most of the material given them to mould into soldiers. By all means recruit as few organizations as possible, keeping the old ones filled with new recruits, who are quickly leavened by contact with veterans. We must condemn the recruiting of certain regiments from certain localities. So far as National Guard service being a condition of naturalization, we would reverse the operation. Might it not be considered dangerous to arm an emigrant before he is naturalized? We may see the time when we shall be quite ready to demand naturalization before allowing foreigners to bear arms.

Page 940.—We cannot agree that State authorities should liberally support a National Guard, but must insist that it is just as much a part of the duty of the general government to support it as to make appropriation for the army. So long as the general government assumes any portion of the National Guard expense it would not be possible to draw the line without considerable difficulty.

941.—With all due respect to the officers of the army, it does not advance National Guard officers in the opinion of their men that inspections shall be made by the former. An officer is an officer, whether of the National Guard or of the army, and if the former is not competent to inspect his own men, he certainly should never masquerade under the protection of the State commission.

An additional bureau in the War Department having charge of National Guard matters is an excellent idea, but, for the reasons named above, officers should be commissioned, not detailed, for the instruction of the National Guard. Many National Guard officers are much older than the officers usually detailed, and so positioned

that service under an army officer of much less rank and temporarily detailed, would be neither pleasant nor valuable to either.

The elective method of National Guard officers' appointment cannot be too strongly condemned, as well as the short term prevailing in many States, but we cannot agree that the terms should be during good behavior, as the latter condition is very hard to prove or disprove. A long term, say six to ten years, should therefore be prescribed, so as to give younger and meritorious subalterns a chance. Examination should be held for all promotions as well as first appointments. The inconvenience of using army posts as schools of instruction in the National Guard is so great, that it would not seem to be practicable.

Page 942.—There is not enough of definite detail to the suggestions as to temporary courses and duties of commissioned officers to enable one to commend or disprove, neither would it be likely that desirable men would undertake such an uncertain or desultory course with the results so indefinite—of course a few might be found, but not many. In the active, stirring days that we are now passing through, young men require something more tangible.

Page 943.—We cannot condemn too strongly the latitude suggested as to choice of parade uniform—the plainer the better and it should in all cases conform to that of the army. Complete camp equipage for the whole National Guard would be altogether too expensive for practice. The most that could be expected would be that sufficient for such bodies of troops as were quartered at encampments on State camp grounds, and for use at such for practice.

Page 944.—Two ranges are unnecessary, one being ample for all purposes, but whatever is used by the army or National Guard must be kept intact for them and the use of it prohibited by others.

Page 945.—The expense of transportation for the bi-annual general competition would be prohibitory.

Page 946.—It has seemed impossible in the past that the War Department should loan its guns and carriages to the National Guard, and we should hail with delight any such condition. Equipments should be furnished by it as well. It can be safely stated that the lack of cavalry is owing almost wholly to the expense of good mounts.

Page 947.—We have often been surprised that the National Guard in seaport cities like San Francisco, did not annually occupy forts and the works adjacent and communicating, and we fully believe such experience would be of the greatest possible value.

A discrimination between men for service in artillery as against more active service, would not be possible, as, under many circumstances—as those who served during the Civil War will remember—the one service is as hazardous as the other, and heavy-artillerymen are quite likely to be called into the field in times of great need.

Page 949.—The census ratio is the only proper one on which to fix the strength of the army, and there can be no rational objection to this ratio being changed at each census—there can be no better basis.

Page 953.—We have often been surprised at the lack of general staff education in the army, and cannot but feel that our weakness in that respect is too palpable to close observers even now, and would be still more so in case of war. We condemn, however, the assignments suggested. If there is any department in which we believe both the army and the National Guard to be weak, it is in that of the staff.

Page 954.—When promotion is dependent on the consent of officers passed over, then indeed will there be occasion for the exercise of all the virtues, and we should think that condition had better be relegated to a state of innocuous desuetude.

Page 955.—By all means permit volunteer retirements as suggested, but we do not think any officers so retiring would be of much account, either with the National Guard

or in any other military position. If they don't like the service well enough to remain in it more than 20 years, they had better get out wholly.

Capt. Frank M. Rumbold, Light Battery A, N. G. Mo.

Anent the many excellent articles on "Army Organization" that have appeared in the JOURNAL, showing very markedly the increasing interest of the professional in the amateur soldiers; and the oft repeated assertion that the great need of the National Guard is increased appropriations of the "sinews of war" and instruction by those whose profession it is to be skilled in the "arts of war"; it seems strange that none of the many writers have proposed a scheme whereby the interest and influence of the quite numerous national guardsmen could be enlisted.

As regards increasing the efficiency of the Medical Department of the National Guard, the guardsmen have taken the *initiative*. The third annual convention of these professional men was lately held and the association changed so that medical men of the Regular Army could become members. Some of the army attempted to throw cold water on the scheme at the beginning, but the three meetings held have demonstrated that, if properly handled, great good will be accomplished not only in the National Guard but in the Regular Army.

Why could not some such association be formed among the, more strictly speaking, duty officers of the Regular Army and National Guard? For the Regular Army, let each regiment of cavalry and infantry be represented by one officer to act as delegate, each battalion of artillery one delegate, and one delegate from each of the various departments of the general staff. For the National Guard, each regiment of cavalry and infantry or unattached battalion by one delegate, each light battery by one delegate, or one artillery delegate from each State, and one delegate from the Governor's staff of each State. The delegates to meet once a year; the session to be four to seven days; the place of meeting to be some central point, or preferably some large post.

It is confessedly the case that the National Guard officers, more now than ever, hold their commissions on account of personal worth and experience, and hence can exert more influence than formerly with the members of the State and national legislature, providing there is an amalgamation of interest and a definite plan from which to work. It might even be said that the National Guard officers, if working under some such guidance, could exert more influence as regards legislation for the betterment of the army than can the Regular Army officers.

At the proposed meeting there would be some one officer from nearly every regiment of the National Guard who had learned the views of his brother officers as regards how their organizations could be benefitted, and who was cognizant of the needs of their State organization. Papers would be read and discussed with great benefit to all, and Regular Army officers might be enlightened regarding the difficulties of the position of an officer of the National Guard and, by concerted action and advice, certain anomalies of the National Guard formation might be overcome. A committee could be appointed from the Regular Army and National Guard whose duty it would be to formulate some scheme whereby all officers could work in unison for some definite end.

Of course there are officers of the Regular Army and many more of the National Guard who would take no interest in the organization of such an association at first, but as the delegates would be the working force, and as no one would be a delegate unless he were especially interested in the objects of the association, the objections of a few would count for naught. All officers interested in the association, not delegates, could become members and participate in all the proceedings, the right to vote and hold office being reserved to delegates.

With such an association in operation, the Regular Army officers, who are writers and thinkers and hence shapers of the destinies of the army, would better understand the National Guard, could greatly instruct them and advance their interests; while it might be that, if properly handled, the association would redound to the advancement of the interests of the Regular Army. If, as has been stated in many of the articles, it is a matter of surprise that, hampered by insufficient appropriations and great indifference of the legislators, the National Guard have made the advance they have; how much more could be made with their interests fathered by the influence of some such association! Especially would this be the case with the impetus given by the active, real interest of the Regular Army officers. Such an association would be conducive to remove whatever of feeling, other than perfectly friendly, there still exists between the Regular Army and National Guard. It is beginning to be understood by all officers that the safety of the country, and not less the personal safety of the Regular Army, will be conserved by the closest of cordial feeling between the officers of the two services.

While the medical men of the National Guard could and did as professional men take the initiative in the formation of their association, the line officers of the two bodies stand in a different relationship; and as the Regular Army officers are or should be the most interested in the subject, they should take the initiative in the formation of such an association as is proposed, providing it is deemed well by the regulars to have such an association.

Let the Regular Army propose an association with some object in view and the "tin" soldiers will respond readily and pay all their expenses with the "tin" which they are at present forced to spend so liberally to maintain their organization.

Help us, you who should be the leaders in anything that will increase the efficiency and usefulness of the citizen soldiers, and you will find those citizen soldiers grateful.

Dr. A. E. Dickinson.

Scarce can soldier or citizen read the comprehensive article in your September issue on Army Organization, by Capt. E. L. Zalinski, without feeling pride, stimulus and marked benefit. I will most cheerfully agree with all his views in regard to the advisability of connecting military exercises with school duties. Early training in the military art, commencing with the grammar school, is essential to the national welfare, and invariably results in great benefit to the youth receiving such instruction. This matter has been so thoroughly and ably handled by Lieut. W. R. Hamilton in *Outing* magazine, July, August and September numbers, 1892, that a mere reference is sufficient. Nor can I disagree with Captain Zalinski in his statement that West Point can be made more serviceable, although I confess that I more heartily agree with the recommendation of Lieutenant Hamilton that West Point be only possible to those who have already graduated at a State military school, those in turn being only possible to cadets who have received preliminary instruction in the grammar schools, or its equivalent in private schools. As this has been so thoroughly gone into by Lieutenant Hamilton I will not enlarge further. It goes without saying that neither the plan of Lieutenant Stewart nor that of Captain Zaliniski, is possible in the country at the present time. Did they pass one Congress they would be as surely repealed in the next. Theoretically these plans are all right. They do great credit to their distinguished authors, but they are as impossible as a trip to the moon. What plan may then be devised that will be likely to be adopted by the lawmakers? Certainly not one that largely increases the regular army or adds much to the present army bill, even now considered by many to be an unnecessary burden and waste. We ought, in my opinion, to do the following:

First.—Make military drill compulsory in all public grammar and private schools of similar grade, under competent State military instructors, all other military instruction to be forbidden.

Second.—a State military school should be established in each State, about on a par with the present West Point, to which all suitable graduates of schools under No. 1 might enter.

Third.—The companies, battalions, batteries, etc., of the grammar schools should be consolidated into regiments, brigades, etc., and all officers above first sergeants' be drawn from the State schools. Monthly regimental drills should be held, the latter under the supervision of an officer of the regular army not under colonel in rank. The Professor of Military Science of the State schools should be an officer of the regular army, not under captain in rank.

Fourth.—The State should furnish all arms and equipments, the annual appropriation from the national treasury being suitably increased for this purpose.

Fifth.—The United States military academy should be a staff college, covering all grades of the service, and no officer should enter it who had not honorably and successfully passed all intermediate grades; further, it ought to be increased in capacity, and its organization and curriculum so changed as to meet the wants of the service and the increased number of students.

Sixth.—The National Guard, while remaining a State organization, should, within five years of the organization of the State college, receive all its line officers from its graduates.

Seventh.—The national army need only be slightly increased, but some ratio of gradual increase according to population ought to be adopted, and its re-organization by modern methods provided for. In ten years it ought to be impossible to continue in active service, unless officers lower than colonel in rank had passed through the army post-graduate schools, such as the school of artillery, school of infantry, etc., which in time should become wholly post-graduate; and in due course of time it should be impossible to continue in service unless an officer had passed through all the intermediate schools up to and through the staff college.

Eighth.—Yearly all grammar and private schools should be inspected by the State, and all State schools inspected by the War Department. At all State encampments the regular army ought to have a contingent. No officer detailed as professor of military science should hold command in the field, nor should he hold a detail long enough to unfit him for active command.

Ninth.—While gray may be the best for all cadets in introductory schools, *i. e.*, grammar and private schools, all higher schools should wear the blue. It is our national color, and the right to wear it was gallantly won. There is a sentiment in uniform, notwithstanding Capt. Zalinski. One flag, one country, one uniform, should be taught.

Tenth.—It would be necessary at the start to increase the number of officers detailed as Professors of Military Science to about 125, because the National Guard have but few officers competent; but in a very few years the State would have officers of its own educating, thus releasing to other duties all regular army details, except one or two to each State.

Eleventh.—I do not agree with Capt. Zalinski that the country should be divided into recruiting districts. This would be unpopular in time of peace, if not intolerable. If reference is made to the statistical part of Lieut. Hamilton's article it will be seen that there are now about 25,000 cadets under more or less military instruction. Later statistics increase this number. About fifty per cent., or over 10,000, are going yearly into civil life with considerable knowledge of the soldier's duties. Under the plan here

XUM

outlined there would be fully 100,000 students going out each year inculcated with military knowledge and spirit. They would largely increase the National Guard and form a reserve unequalled in any pure republic.

Twelfth.—Rifle practice should be encouraged, and each State should have a range. Horsemanship should be taught, and it goes without saying that all officers ought to be able to ride well. Some of the ridiculous sights now seen at State encampments would thus be avoided. The State should provide for such instruction at her own military schools.

Thirteenth.—Infantry will necessarily predominate, yet due attention should be given to field artillery, machine-guns, cavalry, etc., and all our lake and sea-coast States should also have heavy artillery companies.

Fourteenth.—Although I have not designed to cover the technical ground gone over by Capt. Zalinski, yet I must believe his plan will fall to the ground by its own weight. It will never be considered by a Congressional committee. What I have here outlined could be made of gradual growth if New York, Pennsylvania or Massachusetts would take the initiative and start State military schools and make military instruction compulsory in grammar schools. It would only be a few years before other States would fall in line. The seed thus sown would yield its fruit, and its full benefits would follow surely if not quickly. In all the intermediary schools particular attention should be paid to the setting-up drill, and it should continue during the entire course. Its effect is wonderfully beneficial on the developing youth. It gives erect carriage, develops the chest, throws back the shoulders and benefits the entire muscular and digestive system.

Fifteenth.—With this small army and a small National Guard upon which to rely, it should be the aim to supply the army, the National Guard and the schools, with the best and most modern arms and equipments. Let the cost be as it may. The best arms are none too good. If we are to expect the budding soldier to prove in later years valuable in the field we must start him right. There is no time when war comes to teach the methods of new arms. Let not the present absurdity at West Point be repeated, of teaching the profession of arms with obsolete material, or of using artillery horses for light cavalry drill.

Sixteenth.—Wealthy men often give liberally to educational institutions. Let some of them endow schools to teach the military art, or lend a helping hand to those already established. The value of the military work done at the old Norwich school prior to the late war is almost incomprehensible, and the work done the present day at Orchard Lake, Chester, Poughkeepsie, Bordentown, etc., is scarcely equalled in any National Guard company, and is far from being appreciated by the War Department, the State, or by the country at large. How could a few thousands be better spent to-day than by sending the requisite number of thoroughbred Kentucky horses to the deserving school at West Point. Every dollar spent to help a military school would make the millions easily reached in New York and other centres more secure. Next to taking up arms in defense of one's country, scarce can one do a more creditable act than suitably to prepare those who are pledged to fight its battles.

Seventeenth.—I quite agree with Captain Zalinski that there is need to make the regular service more attractive to private soldiers. The pay should be advanced, allowances increased, clothing improved, and extra duties lessened. From a private to the general in command the army should be a school and its motto "Never ceasing advancement."

XUM

III.

"Is the Three Battalion Organization the Best for Us?"

Captain F. H. Edmunds, 1st U. S. Infantry.

LIEUTENANT BUSH, in his criticisms of my article on the above subject in the July number of the JOURNAL, appears to me to have fallen into the error of all who advocate the three battalion organization for us. He entirely overlooks the last two words of the proposition, viz.: "For Us." They are very important, and on them all the argument should bear.

That a three battalion organization fulfils all theoretical conditions it is not for me to dispute. That we do not fulfil all or any of the theoretical requirements of a three battalion organization, can hardly be contradicted by the most ardent advocates of the system. I cannot pass the criticisms of Lieutenant Bush, because they express the opinion held by many in our service to-day, which opinion to my mind is very erroneous, and one which, if persisted in, may lead us too late into irretrievable error. A war may find us worse prepared than ever before. This opinion contains the advanced theoretical ideas on organization and tactics which prevail among the leading military nations of Europe, and which ideas it is sought to apply to our army and to our people in preparing them for war, while losing sight of the most important fact that the conditions which prevail with us are radically different in whole and in part, in principle and in detail, from those found among the nations which it is proposed to imitate.

It is true that, "The tactics in use in the United States * * * have all been adapted from the German and French systems." And is it not easy to find the reason why our tactics have been taken from the French? From force of circumstances and surroundings, our people early learned the value of individual marksmanship and the habit of self-reliance, in other words they were compelled to fight in extended order, or as skirmishers. The value of this experience and method of fighting is well illustrated by the battle near Fort Duquesne, and enabled Washington to save the remnant of the British force and withdraw it from that disastrous field. The republican armies of the French revolution were preceded upon the field of battle by clouds of skirmishers, spoken of by Thiers as most unusual and a radical departure from established methods; and can we not trace to this employment of the individual upon the battle-field, analogous to our own practice of the time and later, our partiality for the French system of tactics?

Our adoption of any German system was purely an accident, due to the presence of the Baron Steuben with the Revolutionary army, and his labors were mainly valuable for the discipline instilled in the troops, and in no wise changed our method of fighting; but by improving the discipline, improved the *morale*, and consequently the staying qualities of the troops. It is a noteworthy fact in this connection, that during the whole war of the Revolution the American troops but twice used the bayonet to any extent, viz., at Stony Point and Eutaw Springs. Plainly shock action was not their forte and they could not be expected to so engage the highly disciplined and seasoned British troops.

I can hardly believe that the eminent authorities quoted by Lieutenant Bush would have contended for the three battalion organization without the proviso attached that the regiment should consist of at least 1200 men. Our infantry regiments to-day have about one-third of the above number, which would be the minimum for a three battalion organization suitable for the application of the new Drill Regulations, and what emergency—let any one say—will increase the strength? If an emergency

should increase the strength, we would still be in sorry straits, because our extended order movements require much preparation and cannot be acquired in a day or a month.

We are a nation by ourselves, under peculiar conditions; let us respect those conditions.

IV.

"History of the Second Artillery."*

Lieut. E. M. Weaver, Jr., 2d U. S. Artillery.

IN no one of the historical sketches of regiments which have appeared in the JOURNAL does the great value of them and the wisdom which suggested the series stand out in bolder relief than in the history of the Second Artillery, by First Lieutenant W. A. Simpson, Adjutant Second Artillery, in the July number.

Very few can know the difficulties which attend the preparation of an historical sketch like this of a regiment whose organization extends back to the very earliest days of our Government. It must be brief, because of the severe limits allowed it in the JOURNAL. It must also include all salient facts.

Lieutenant Simpson has gone over the field in which his subject rested with characteristic patience and persistency and a special talent for work of this nature. By reason of the loss of many of the early records of the regiment and the meagreness of old reports it became necessary for the author to resort to personal inquiry and original research in order to give a continuous record. Thus through correspondence and personal examination many interesting and important historical facts have been rescued from oblivion and placed here where they may be referred to by any one who appreciates the subject.

The Second Artillery will ever thank Lieutenant Simpson for having crystallized into some form all these facts which have been held heretofore in irregular suspension, for having taken the first real step in passing from the legendary phase of our regiment's history to that of written record. But preëminently, above this, the artillery branch of the service as a whole owes him a debt of gratitude for having painted in striking colors and correct perspective the defects of our present organization as revealed in the service of the arm in the past; the slights, neglects, injustices to which the artillery has been exposed in consequence of this defective organization.

This history shows that the Second Artillery has been employed chiefly as infantry. Except during the Mexican War and the War of Secession no considerable number of batteries have been armed, equipped and used as artillery at any time. The regiment has never had any training worthy of the name in the duties of coast defense. What is true of the Second Artillery in this respect is equally true of other artillery regiments, and it may be asserted that we have never had a properly instructed coast defense corps, because at every available opportunity, and often without sufficient excuse, the foot artillery has been taken from the coast and sent to the interior to serve as infantry.

It is understood, of course, that the foot artillery, like any other part of the armed force of the nation, should be available for service in any capacity, and for any purpose whatever in which a military force is necessary; but it is claimed that when the exigencies of the country require a special corps, like coast artillerymen, to be called off from the coast, the good of the country demands, equally, that the detached service should be temporary, and that as soon as possible the special corps should be

* Forwarded from Lafayette, Indiana, August 1, 1893, too late for insertion in September JOURNAL.

returned to its normal functions. Lieutenant Simpson's historical sketch shows that this principle has not received due consideration by our military authorities in the past.

It may be thought by some that the regiment ought not to be unmindful of the glory that came to it by reason of its service as infantry. It is not. The regiment prizes highly its foot service in Florida and Mexico and elsewhere; but it must be said on the other hand that this glory rightfully belonged to some good infantry regiment, and it was secured by the artillery at the expense of total neglect of coast defense duties, and, what is most serious of all, the complete extinguishment of all artillery *esprit* and the loss of artillery training.

The unrighteousness of this treatment must appeal to every unbiassed mind. It would seem that some voice must have cried out long ago against this practice of using the artillery as the Cinderella of the army.

It is believed that if a proper conception of the special nature of coast-defense had existed, and if had been clearly appreciated that coast artillery is, properly, a special corps, in the same sense as the engineers, the navy, the marine battalion, or any body of men assigned to a distinct work, all this would have been otherwise; perhaps there would have been a chief of artillery, who would have asserted the principles here set forth, and contended for the legitimate rights and functions of his corps.

No point in Lieutenant Simpson's history stands out more prominently than the utter uselessness of the regimental organization for artillery. Neither in peace nor in war has the Second Artillery, as such, ever served for any length of time or fought together as a regiment. The fact that a part of it has been mounted and a part on foot of itself prohibits regimental action as a unit in so far as manœuvring is concerned. Such a heterogeneous unit is in truth an absurdity, and yet our Army Register shows these so-called regiments duly efficient with a full complement of regimental officers, as if needed for fighting just the same as infantry or cavalry.

It cannot be said that the regimental organization is necessary for administrative purposes. As a matter of fact the administration of the entire army is conducted with the post as a unit. The colonel of the regiment or any other regimental officer, has no material active administrative powers except such as come from his relation to the post organization. Lieutenant Simpson has recently in *The Journal of the U. S. Artillery* pointed out the limited sphere of action of a colonel of artillery.

Is it not about time to bring this subject up for careful consideration? Here is a regiment, officered on the basis of its requirements in war, composed of two distinct classes of troops. One class is mounted and mobile and forms an integral part of the army division and the army corps; the other consists of foot troops, is essentially passive, has no connection whatever with the field army, but, in its proper functions, is attached to a section of the coast. Why should these two essentially distinct classes of troops be held longer in an unnatural union? Ought not the coast artillery to be organized separately as a special body with its own chief? Ought not the field artillery to be organized with a battery, battalion, regimental organization corresponding with the regiments of the field army? These are practical questions and should be considered before further legislative action in Congress is pressed. In all modern armies the coast artillery and field artillery are distinctly separated, each with its own organization. Why not with us?

The organization of the field artillery ought to provide for a command for a major, corresponding to the German *abtheilung*, and our drill regulations should have a school of manœuvres for this with the major as instructor. In the next war it should be well understood that field officers of artillery have active parts to to play. General Tidball has recently shown in the JOURNAL how the artillery suffered in this matter during the

XUM

Civil War, and the late General Hunt often spoke of it and wrote of it. The Federal artillery was fought by battery throughout the war. Captains alone had active commands. The field officers, being denied the privilege of fighting their own arm and receiving promotion in its service, were forced to the other arms or relegated to obscure administrative duties. In case several batteries were temporarily placed together, a captain was placed in command. Lieutenant Simpson says for example, in this connection, that "when the horse artillery of the Army of the Potomac was, in 1864, consolidated into one brigade, the command was given to *Captain* Robertson."

The Confederate artillery was better managed in this respect. Large masses of artillery were fought in the great battles under the direction of the regular hierarchy of officers. Good artillerymen have asserted that in the use of massed artillery fire the Confederates outclassed the Federals.

In short, field artillery should be fought as organized, and, conversely, its organization should rest on the needs of the battle-field. If field officers are required on the battle-field, they should be permitted to exercise their legitimate commands; if they are not needed, they should not appear in the Army Register. All European armies recognize this and fight the artillery according to its organization, giving to field officers large responsibility in the management of massed fire.

While it may be granted that it is desirable to maintain the battery, battalion, regiment organization for the field artillery, it must be admitted that a different set of conditions apply to coast artillery. In the defense of a fort the coast artillery is the primary arm; on the battle-field the field artillery is an auxiliary arm. The armament and defense in the former case depend on the features of the harbor or channel and anchorage grounds about the point defended. How deep is the water? and what ships can come in? those are the fundamental questions in coast defense. With field artillery the central idea is to support the work of the infantry; to be subordinate.

The regiment is not necessary in coast artillery because coast defense has to do with forts as units and a combination of forts as higher units. There is no more need for a regimental organization in this work than there is for one in fighting afloat; there is, in truth, as much reason for organizing the Navy into regiments as the coast artillery. But, more than this, if there be no *raison d'être* for the regiment in coast artillery, its existence is a positive harm.

In conclusion it may be said that this brief historical sketch of the Second Artillery by Lieutenant Simpson shows that the questions of the duties and proper organization of the coast and field artillery have been neglected or wrongly considered from the beginning; that there is not now and never has been any suitably organized or efficiently trained personnel for coast defense; that the present organization which binds in an unnatural union the coast and field artillery is harmful to both and has operated to deprive the country of properly trained artillerymen of both kinds; that the present organization is useless in peace and impossible in war; that it has been instrumental in denying to artillery officers the opportunity of serving in the higher grades in war; that, finally, the organization of the two kinds of artillery into one regiment is responsible for the promiscuous use of the artillery as infantry for long indefinite periods, thereby emasculating it as an arm of the service and rendering it contemptible in its own eyes and those of all others.

It is believed that all who consider the subject with candid minds will freely admit the reasonableness of the arguments in favor of a separation of field and coast artillery. The only argument the writer has met opposed to the general proposition is, that "it is not expedient to advocate it, because Congress will never consent to so radical a step." It is not believed that any injury to the cause will be done however if some adhere to the good old principle that "whatever is right is expedient."

Reprints and Translations.*

MILITARY CRITICISM AND MODERN TACTICS.

By the Author of "The Campaign of Fredericksburg."†

From the United Service Magazine, London.

(Continued from Journal No. 65.)

IT has been claimed by an American general that the Americans taught the Prussians the use of extended order. This claim we can scarcely admit. The devastating effects of modern fire forced extended order on the troops in both cases. The Prussians learnt nothing from either Federal or Cenfederate, unfortunately for themselves, for they might have learnt a great deal. Had the battles of the Secession War been studied in Berlin instead of being dismissed with a contemptuous allusion to mobs of skirmishers, the faults enumerated in my preceding article would have been foreseen; and a knowledge of the modifications of the old formations necessary to achieve decisive results would have been gained without the lavish expenditure of life which the defective tactics of 1870 entailed. Skobeleff, the first of European generals to master the problem of the offensive, knew the American war "by heart," and in his successful assault on the Turkish redoubts on the otherwise disastrous 10th of September "he followed the plan of the American generals on both sides when attempting to carry such positions: to follow up the assaulting column with fresh troops without waiting for the first column to be repulsed."

The American tactics, although so far as drill went the French rapidity of evolution and manœuvre was adopted, were very English in their methods. That we taught their fingers to war we have not the slightest wish to assert. But a strong similarity exists between the tactics of the Civil War and those taught in the English Field Exercises from 1870 downwards. It is possible, on the contrary, that the lessons of the war had not been altogether lost in England, and that they exerted an influence of which English soldiers were scarcely conscious. In the first place, the unity of the battalion was scrupulously respected; and although the leaders of the units in the fighting line were allowed a free hand as soon as superior control became impossible, they were neither encouraged to manœuvre nor permitted to deviate from the line of direction the commander had assigned. Secondly, the traditional formation in three lines was the basis of all dis-

* Please address communications concerning reprints, translations and reviews to Lieut. J. C. Bush, editor of this department.

† Major J. F. R. Henderson, Staff College, England.

positions for battle. Thirdly, the second and third lines of each division were, as a rule, supplied by its own brigades, and not by strange units; that is, the division went into battle on a narrow front and with great depth. Fourthly, the preliminary dispositions were carefully carried out; and lastly, as both common sense and experience taught the leaders that to carry a position, line after line, regardless of cohesion, must be piled one on top of the other, the process of rallying, not only when the enemy had been driven back, but at every pause in the attack, was a universal rule in battle, and constantly practised in the camp.

"The American troops," says an officer who commanded a famous volunteer regiment, "found their places surprisingly quick after a charge. Many regiments were constantly drilled in rushing and assembling after being checked in confusion."

"Battalions," writes another officer of higher rank, "had to deploy when the fire became heavy, and became more or less scattered and disorganized in the advance. There was confusion after a successful attack, but our men rallied readily; generally the colors were planted in convenient places, and the men fell in on them rapidly."

Again: "There was almost more or less confusion, but only momentarily, in a successful charge * * * in such cases reforming was but the matter of a few minutes."

Now this consensus of opinion as to the rapid reformation of the American tactical units indicates that the methods of the attack and the disposition of the battalions were based on sound principles. The high intelligence of the men and the practice of the drill-ground doubtless had a share in so satisfactorily overcoming confusion, but sound principles played the chief part. It may also be remarked that the Americans adhered to the essentially English organization of the battalion into a number of small companies, and which, when the tacticians who choose the Prussians as their model attempted to overthrow it in favor of four large companies, was so strongly upheld by the almost unanimous voice of the British army. American experience quickly detected the faults of the Prussian system, and the opinion of General Upton, the officer selected after the war to rewrite the Drill-Book of the United States infantry, is well worth notice.*

I have already spoken of Skobeleff's successful employment of American tactics in the third battle of Plevna, and if we study the accounts of his operations against the Turkish lines, it will become apparent that there was a fundamental difference between his ideas of battle and those which prevailed amongst the Prussians in 1870. True to the traditions of Suworoff, and to the teachings of American soldiers, Skobeleff's end and purpose was to bring the bayonet into play; to prepare the way by fire, but to hand over to the bayonet the decision. The Germans, on the other hand, relied on fire, and on fire alone, to beat down the enemy's resistance: the final charge was a secondary consideration altogether. The result of this was the great development of the front of battle, the constant pressure towards the flanks, in order to seek out positions from which to bring an oblique or flanking

* The Prussian Company Column. Pamphlet. Published 1875. R. U. S. I. Library.

fire to bear, and thus to develop the power of the fire-arm to the greatest possible extent. To surround the enemy in a circle of fire, as exemplified by Sedan, was the chief aim of German officers of every rank. Generally speaking, there was no endeavor made to hurry on the decision by more resolute methods. Now, the Americans had come to a very different conclusion. They had not to do with an army like the Austrians, who could not reply to the fire, nor to one like the French, who habitually neglected their flanks, and from whose partial counterstrokes they had nothing to fear. The experience of Cold Harbor and Chancellorsville taught to the Federal and Confederate not only how to secure their flanks, but also the necessity of powerful counterstrokes. The generals on both sides, unless their numbers, as were Sherman's, in his Atlanta campaign, were far the greater, found that enveloping tactics were seldom possible and always dangerous; and that to prevent the battle degenerating into a protracted struggle between two strongly intrenched armies, and to attain a speedy and decisive result, mere development of fire was insufficient. The fighting qualities of the men must also be taken into account. It may fairly be questioned whether any amount of fire would have driven back the troops which garrisoned the opposing intrenchments of Lee and Grant at Petersburg in the last nine months of the war. From a very early period the tenacity which there displayed itself in such heroic fashion had been remarkable. "Time and again," says one of the officers above quoted, "according to all precedent, one side or the other ought to have been whipped, but it declined to be anything of the sort, and obstinately refused to give up. The losses show this. They are often out of all proportion to results, as results would have been shown on the Continent of Europe. We in America agree with Colonel Chesney, who thinks that this was due, in no small measure, to the quality which the troops on both sides inherited from the stock that furnished his infantry to the Duke of Wellington." Nothing is more noticeable in the history of the Civil War than the manner in which the American troops refused to recognize that their position was turned. The ordinary rules of war were over and over again set at defiance. "Never to know when they were beaten," was a characteristic of both North and South. But troops possessing this quality can only be defeated by sheer weight of numbers, by superior physical force; and it was for this reason that the dominant idea of American tactics was to come to push of bayonet. The fire of the skirmishers was employed merely to cover the advance of the assaulting line, not as in Germany to open a path into the enemy's position. The American troops, therefore, were drawn up for battle in the deep formations usual in shock tactics; that is, in three lines closely supporting one another.

Now the question is, which was right? The extreme extension of front, its consequent medley of units and difficulty of control, or the determined charge of successive lines of battle, with its great expenditure of life compressed into a short time and a small space, and culminating in a vigorous assault. The decision is no easy one; but for those who have faith in the traditionary tactical capacity of English soldiers, there is no need to go far to find a judge. This capacity has found expression in the Drill-Book of

1889, and in the pages devoted to the Attack will be found the true solution of the problem. It may be noticed in the first place that in those pages but little stress is laid on flanking fire or flanking movements. And for this reason, that the Drill-Book does not profess to instruct those who have the supreme control over offensive operations, but those who have to carry out the details. This omission makes clear, therefore, that flank attacks and the development of flanking fire (on a large scale) are held to be the province of the superior authorities: they are not within the province of those officers whose commands merely form units of the whole force. On the contrary, instead of encouraging excessive exercise of initiative, the paramount importance of order, of the cohesion of the attacking body, and of maintaining the true direction, is inculcated on every page.

"Extended order is the rule, close order the exception"; "great clouds of skirmishers and small tactical units, that is the form for infantry."

These were the cries that were heard on all sides after 1870, in England as well as on the Continent. But in England there were men who saw the dangers and the exaggeration of the new theories, who held that close order was now, as heretofore, the backbone of the attack, extended order no more than an essential accessory. Nor did they, and here the army was always with them, accept the necessity of breaking up the battalion, and of sacrificing unity to the initiative of the subordinate leaders. To their views opinion has veered round. The true mean has been struck. Close and extended order combined are officially taught as the form for infantry; close order whenever it is possible, extended order only when it is unavoidable.

Secondly, the instructions of the Drill-Book are principally concerned with the execution of a frontal attack. There is no disposition manifested to shirk the difficulties of such an operation, but neither is there timid insistance on those difficulties. That flank attacks are, for the troops engaged therein, to all intents and purposes, frontal attacks; that flank attacks must be assisted by attacks on the front of the position, and that frontal attacks will often be the only way to victory, are tactical truths which have been fairly faced. Moreover, and this point is most deserving of attention, the success of the frontal attack is considered well within the bounds of possibility, and the delivery of the final assault of no less importance than the preparation by fire. It is here that the system of attack differs so radically from the practice of 1866 and 1870, and approaches so close to the practice of the Secession War.

It is scarcely necessary to mention that this system was scouted after 1870 by the Prussians and their admirers; and, it may be remarked, that although the latest regulations appear to indicate that the Krieg's Ministerium contemplates a return to older methods, the question has not been approached with confidence. Even the author of the "Summer Night's Dream," reformer as he is, makes no further use of his closed Züge than to bring the units intact into the firing line. The firing line, in Germany, is still the fighting line.

To those who are unwilling to accept the Drill-Book as an infallible guide it will be perhaps more satisfactory if we test its teaching by the light of history. At the outset we must bear in mind that it is written for

a voluntary army and not for a host of conscripts. Despite the overthrow of the professional army of France by the national levies of their great antagonist, the old adage that expresses tersely the relative efficiency of volunteers and "pressed men" still holds good, and in comparing English and American tactics with those of other States, should never be lost sight of. It would be rash, however, to assert that had the Prussian Guards in the disastrous attack on August 18 been replaced by men who had taken arms of their own free will, St. Privât La Montagne would have fallen without the aid of the flank attack of the Saxons. The courage of the men who advanced up the long glacis under that terrible rain of bullets is beyond suspicion. Where they failed none could have succeeded. But at the same time it is fairly open to question whether, had other tactics been employed, St. Privât, instead of being quoted as an instance of the futility of frontal attacks, would not be now held out as a convincing proof, not only of the possibility but of the decisive results of a vigorous frontal attack on the key of the enemy's position. In the official report of General von Kessler, commanding the Brigade of the 2d Division, we find the details of the combat, so far as regards the battalions engaged, and the impression made at the time on the mind of an experienced soldier.

It has already been mentioned that the attack had not been prepared by artillery. The French guns had been reduced to silence, but they had suffered no great loss in men or material, and from fifty to seventy were still available for further action. St. Privât itself, the strong stone village which crowns the slope 2000 yards in length which lay between the opposing lines, was as yet untouched. Nor does it appear that the French infantry had been shaken by the duel between the two artilleries. A thick line of skirmishers occupied the very meagre cover 600 yards in front of the position. Heavy reserves were hidden in security in the long hollow which stretches from St. Privât to Amanvillers, and a force nearly of 20,000 rifles was ready to overwhelm the attack with the long-ranging fire of the Chassepôt.

The formation of the Guards was in two lines only, the first extended with supports in company column, the second in column of half battalions. As they left their shelter by St. Marie aux Chênes, they were met at a range of over 1500 yards by a storm of bullets. Men and officers fell fast; the supports pushed into the fighting line, the whole moving forward by rushes, and lying down wherever some slight undulation offered cover.

The second line followed at short interval, but its serried masses afforded a tempting target, and the French appeared to watch the moment that they rose to their feet, for Von Kessler tells us that such moments were the signal for outbursts of heavier fire.

Greatly exaggerated as is the estimate of the Duke of Wurtemberg, that in ten minutes 6000 fell, the losses were enormous, especially in officers. But still the Guard pressed on; the outlying French skirmishers were driven back, and it was not until the long lines of wall which surrounded St. Privât and the Jerusalem Farm were approached within a distance of 400 or 600 paces that the attack came to a stand. The second line had be-

XUM

come merged into the first. The commanders recognized that in the absence of support it was useless to press forward, and their further efforts were now limited to holding the ground won at so great a sacrifice. This was done successfully. A counterstroke against their right flank was beaten back by the fire of the two batteries in close support to the right rear, and the French made no attempt to sweep down in mass upon the thinned and exhausted line. Eventually, when the turning movement of the Saxon Corps was fully developed, the remnant of the brigades did good service in the concentric attack before which St. Privât fell.

General Von Kessler's report is too long to quote, but it contains passages which are full of interest. One of these refers to the moral effect of a daring advance. As the brigades approached St. Privât, he relates that the stubbornness of the defense began to relax, that the French seemed to lose heart and confidence at the sight of a large mass of men pressing resolutely forward, despite the terrible fire to which they were subjected. A conviction that the chassepôt was powerless to check the advance appeared to spread amongst them, and more than once he states his impression that had fresh troops been available, they could have been brought up in close order under cover of the fire of the fighting line, and that the position might have then and there been rushed.

A careful examination, therefore, of this attack shows, in the first place, that every single condition was unfavorable, and that, nevertheless, an experienced officer, who had his fingers on the pulse of the action throughout, believed that with further support success was not impossible. The unavoidable disadvantages against which the Prussians labored were almost overwhelming. The position was phenomenally strong. The ground was absolutely open, and both its hard surface and the gentle slope gave the greatest possible effect to ricochet fire. And yet the French first line was driven in, and a sensible effect produced on the tenacity of the defense. But natural disadvantages were not the only obstacles. The preliminary dispositions were insufficient, and the formations faulty. The attack was altogether unprepared either by artillery or by infantry, for the needle-gun was not effective over 600 yards. The brigades, however, occupied a front too extensive for their strength—12,000 rifles (not 20,000, as the Duke of Wurtemburg states) to 2500 paces—little more than four rifles to the pace. There were not troops sufficient to form a third line, and be it remembered that even if the third line is not designed to bear an active part in the attack, the moral support of its presence is of the greatest value. The absence of a third line was of course due to the fact that the Saxon Corps was employed in the turning movement which ultimately forced the position. With this we have nothing to do; we are considering the operation as a frontal attack pure and simple. As to the extension of front, the rule is laid down in the Drill-Book that four rifles per pace is sufficient strength for the attack, but "in the first instance only." This limitation may be taken to mean that in any case a strong reserve should be close at hand, and it can scarcely be considered as applicable to a decisive attack upon a strong point held by large numbers. A heavy bombardment of the village, and the possession of a fire-arm able to reply at once to the enemy's fire,

and a strong force in support, would, in all probability, have brought about success. The total losses would have been excessive, but the result would have been decisive; the battle would have been won whilst daylight still remained in which to improve the victory, and the general total of casualties would not have been increased.

Equally gallant, at first even more successful, but in the end no less disastrous, was Osman's desperate attempt to break the investing lines at Plevna. A force of thirty-three battalions, numbering, perhaps, 15,000 rifles, and organized into a single division of four brigades, crossed the river Vid on the night of December 10, and as the winter morning broke, was arrayed in two lines, covered by a swarm of skirmishers, behind an undulation three thousand five hundred yards from the first of the triple lines of the enemy's intrenchments. After a very short and ineffectual artillery fire, they advanced up an open slope, exposed to the fire of more than fifty heavy field guns and of 3000 infantry, sheltered behind their parapets. At 1500 yards from the position the attack faltered. Osman, riding in the midst of his battalions, reinforced the skirmishers, and the lines swept on. In three quarters of an hour they had approached within striking distance, notwithstanding the heavy fire that met them full in face and exploded the caissons of the few batteries that accompanied them. Two battalions were completely destroyed, but there was no further check. The first line of trenches was carried, and the redoubts were stormed; so swift was the work that the Russian gunners had not even time to bring up their teams, and eleven field pieces were left in the hands of the Turkish infantry. One thousand paces beyond was the second line of works. Whilst the majority of the force secured itself in the position already won, six battalions advanced over the open ground and stormed a lunette and trenches in the second line. Russian reinforcements were now coming up on all sides, but the position was pierced, and another resolute effort would have carried at least a portion of the troops beyond the circle of investment. But that effort was not to be. The second division of the army of Plevna, on which Osman relied to improve the advantages he had gained, found the bridges choked by a dense crowd of fugitives from the town with their household goods piled high on carts and wagons. Only a few battalions were able to make the passage, and it was then too late. The enemy was pressing on in front and flank; the trenches ran so deep in blood, the redoubts were so full of dead and wounded men that even the Turkish soldiery could scarcely abide the horrors of them. Still, whilst they saw the man they had obeyed so well during four months of battle and of famine riding calmly along the line they never flinched; but when the great Pacha, severely wounded, was borne away from their midst, then they gave back, and retired slowly to the river.

Such is the history of two great failures. And it may well be asked if they can be considered as anything else than decisive proofs against the possibility of the frontal attack, if the English system, tested by the experiences of St. Privât and of Plevna, should not be pronounced faulty and impracticable. But of these two operations the latter at least gained a measure of success. This success was due to the fact that the force was

marshalled in several distinct lines; that at the moment of the final rush strong supports were at hand, in good order, and obedient to control. The ultimate failure was due to the fact that it was impossible to follow the principles advocated by the English Drill-Book: the preparation was insufficient, the numbers employed were insufficient, and the artillery did not coöperate. Nothing could be done to secure the flanks of the attack or to distract the attention of the troops on either side of the point assaulted. These are principles as important as those which were held in mind. It was to their neglect that the triumph of the Turks was short-lived, and it is for this reason that it has been cited. Frontal attacks, then, have won partial success. Their ultimate failure was due to the violation of practical principles, and is therefore no proof that frontal attacks are impossible. On the contrary, there is ground for the belief that Napoleon's decisive stroke of piercing the centre of the enemy's line may be successfully applied on modern battle-fields. Nor are those above quoted the only instances of frontal attacks in recent campaigns. If we cannot point to attacks *en masse* successfully conducted in the first phase of the war of 1870, when the mettle of the enemy was that of a disciplined army, there were battles both in Armenia and Bulgaria which supply examples. And despite the general opinion of American leaders that veteran troops behind well-constructed earthworks could hold their own against five times their number; still, over and over again in the Secession War, the strongest intrenchments fell before the determined rush of closely succeeding lines. Wherever the principle was applied of concentrating a powerful force against a single point, of meeting the enemy in superior force at the decisive point, the defense failed, and the presence of intact bodies of troops, answering readily to the demands of their leader, gave the means of securing a decisive victory. I may instance Sheridan's and Wood's attack at Chattanooga, and Longstreet's at Chickamauga. The massing of 30,000 Federals against the "Bloody Angle" at Spottsylvania, had it not been for the precipitation of the second line, would have probably been more than partially successful, whilst Meade's charge at Fredericksburg, and Pickett's at Gettysburg, owed their repulse to the same cause as did Osman Pacha's at Plevna, the want of a strong third line.

In 1870, when the long line of skirmishers induced the enemy to yield his position before their developing fire, and the battle paused, the enemy had time to rally, to man his second line, to bring up his artillery and his reserves. Except at Woerth and Gravelotte, where the victors were in overwhelming numbers, success was never decisive. But a battle divides itself into phases. The defender, if he has any choice in the selection of the field, will take care to have a strong second position to fall back upon. To break his first line so suddenly as to disconcert all his plans, to have a compact force at hand ready to follow up without giving him a moment's breathing space—this is the task of the attack; to drive a wedge into the heart of his disordered masses, forcing his wings asunder, instead of merely pushing his whole line back, and the tactics laid down in our own regulations are the means whereby this task may best be executed. Neither smokeless powder, nor the magazine rifle will necessitate any radical

change, or introduce any important modification. If the defense has gained, as has been asserted, by these inventions, the plunging fire of rifled howitzers will add a more than proportional strength to the attack. The absence of smoke will make the targets more visible to both and render the fire of masses of infantry and of long lines of batteries more effective; it will withdraw the concealment by which the combatants have profited hitherto, but it will shake the confidence of the defenders by exposing to the view of the defenders the strength of the force by which they are confronted. And if the magazine-rifle has introduced a new and formidable element into battle, the moral element still remains the same. Weapons improve, but human nature remains the same. Under a plunging fire from which no bomb-proofs, constructed in the field, can give sufficient shelter, and continued to the very moment of the assault; under the bombardment of an artillery, which is not content, as was the artillery at Gravelotte, and at Plevna, with silencing the enemy's guns, but sweeps the parapets with shrapnel, and aims at producing more than a mere moral effect, will men's nerves be sufficiently steady to enable them to reserve the magazine for the supreme moment? And even if their discipline and endurance enables them to do this, will not the saying hold good, that the value of fire diminishes with its intensity? It is true that "the working value of any system of tactics cannot be ascertained, except experimentally." But it is possible to test the system by history; and history, not of one war only, but of those waged by the great captains of modern times, bears evidence that the principles on which our present system of infantry tactics, and of infantry organization, are based, are sound in every single particular. We have no need, then, to go further than our regulations to learn the method in which troops are to be handled in attack or defense. It is possible, when these regulations come face to face with the realities of war, that modifications in some respects will be found necessary; but, so far as lies within the wit of man, they have blended the best lessons of the past with shrewd forecast of the future, and if modifications have to be made, they will in no way interfere with the general structure of the offensive battle.

There are rules of which some are old as the act of war itself, others produced by the discovery of gunpowder, and by every improvement in firearms; and to break these rules is to court disaster. It is, therefore, of extreme importance that those whose duty it is to lead men in action should have these rules ingrained into their very instinct. To act in accordance with them should have become habitual. It is for this reason that the normal formations for the attack are vaulable and even necessary. If these formations are adopted at the outset of an engagement the preliminary dispositions, which have been shown to be essential, will always have been made. And if the formations are unsuitable to ground or circumstances, they are exceedingly elastic—susceptible of ready modification. In every case, the foundation for sound offensive tactics will have been firmly laid. It is wiser to establish a habit than to expect in every case unerring initiative. Be it remembered, that the German system of insuring able leaders is very different from our own. The officers of the Imperial army are under constant supervision. Their tactical capabilities undergo incessant tests. So

XUM

ruthless is the system of rejection, that a few mistakes in field manœuvres leads to speedy retirement. The application of the system is short and sharp. The supreme authorities are not called upon to decide, nor do they admit appeal. The hint of a brigadier that an application for sick-leave will be favorably considered is enough, or an explanation of the mistakes committed in the presence of the whole of the officers of a battalion. So precarious is the tenure of command, that one often hears the remark that So-and-so goes to bed with his pickelhaube on one side and a silk hat on the other, for he does not know, when he wakes up, whether he will find himself soldier or civilian.

With such summary retribution staring them in the face, German officers might be safely left to work out their own salvation in the way of formations. It is otherwise with ourselves. English soldiers are brought up with the idea that obedience is of more importance than initiative; they are accustomed neither to the independence which wrought such disorder in 1870, nor to the despotic methods which cut short so many a career. We have no reason to fear, looking at past history, that initiative will not be forthcoming when it is required; but trained as they are to look for regulations at every point, it seems unwise to trust them entirely to their own resources in the most important work they have to undertake. It is not only in this respect that such an instruction is dangerous. The normal practices make the habit of acting on sound principles instructive; and if an officer is left to his own ideas, without guide than such general regulations as appear in the German field exercises, it is very probable that he may overlook or disregard some principle of vital importance. Under constant and close supervision this would be impossible. But English battalions are seldom under constant supervision. They are not always under the eye of officers trained as those who compose the German staff, and bad habits would not always find an immediate corrector.

With the vexed question of initiative versus subordination we have now nothing to do; but I may express the conviction that the actions and the tactics of 1866 and 1870 are in this respect exceedingly dangerous models, especially as regards the conduct of infantry on the offensive. Order and concentration are of no less value than energy, and an adherence to the normal formations provides for both. Moreover, if the decisive attack is to retain the form which has always proved successful, *i. e.*, the rush of successive lines after due preparation by fire on some selected portion of the enemy's position, it is difficult to conceive circumstances in which these formations would not be strictly applicable. The distances between the various supporting bodies will naturally depend on the ground, and also the manner in which the successive lines are brought up; in this last process, and in the judicious employment of fire, initiative will find scope; but the division into three lines, the distribution of strength, and the duties assigned to the three lines, as laid down in the normal formation, must never be departed from. And with an army whose daily practice it is to carry out these formations, it will be seldom that these important principles, the foundation of success, will be disregarded.

Lastly, if, as we are firmly convinced, the attack of a large force upon a

single point, whether as stroke or counter-stroke, is still the crowning act of battle, it is an operation which should be familiar to every officer and man. It is necessary that divisions, and even larger forces, should be exercised as the single unit to which such a duty is assigned. Such an operation is full of difficulties. Many are the obstacles which may be expected to interfere with the progress of the attack. Advanced posts to be carried, counter-strokes to be repelled, cavalry to be driven back and incidents of like nature are well calculated to destroy the symmetry and create confusion. Nor will it be an infrequent occurrence that the firing line will have exhausted all its supports and reserves without shaking the enemy or approaching within effective rifle-range. Then, if the attack is to be driven home at all costs, it will be necessary to strengthen the skirmishers from the second line, thus piling battalion upon battalion, and to bring up troops from the third line to fill the gaps in the second. To this mixture of units men and officers must be trained; and such training will not be harmful if the paramount importance of order and cohesion is understood by all.

It is, perhaps, a consequence of our little wars, and of our small, isolated garrisons, that there is a tendency amongst regimental officers to look upon the attack formation as a procedure which principally concerns the battalion. But against a civilized enemy, and on more extended battle-fields than those to which we are accustomed, the individual battalion would play but an insignificant part. It would form but one amongst many units, for a decisive attack would be seldom committed to any force less than a division, and it is even probable that a whole army corps, with two divisions in front line and one in reserve, would be called upon to undertake the operation. Now, in any movement made in such strength as this, order and precision are the most important considerations. To each division would be allotted a certain front, and unless that front were accurately maintained, crowding, confusion, and deviation of parts of the line from the true direction, would be the inevitable result. In fact, the movement would have to be carried out, until at least within 600 yards of the position, with all the precision of a formal parade. Now, if every battalion engaged in the fire line were to adopt a different formation, and, if the commanders were left to their own initiative, such might well be the case, it would be difficult in the extreme to preserve the necessary intervals between the component parts of the attacking force. For an operation of this kind a normal formation is absolutely necessary.

It may be argued that the Germans, who are more likely to have to employ great masses in the attack than ourselves, have, in their latest field exercises, discarded all definite prescription. This is true enough, so far as the field exercise goes. Here it is constantly held in view that to trammel the independence of the leaders of the firing line is to forego victory, and therefore, general principles only are inculcated. But, so far as the daily work of the German officers and soldiers is concerned, it will be found that in every army corps certain rules are laid down which must be followed by the battalion when attacking in combination with other troops; and if these are not quite so precise as those given in our own Drill-Book, they are supplemented by more detailed regulations in every single infantry regiment.

XUM

What the Germans are careful to do is to recognize that once the zone of aimed infantry fire is reached, the control of the firing line must perforce be resigned to the section leaders, and that even the captain can only exercise a very general supervision over his company, whilst battalion commanders are expressly forbidden to interfere, during the passage of this zone, with the action of their subordinates. There is no disposition to restrict the responsibilities of the subaltern officers, and the maxims laid down in the field exercises, as well as the training of the battalions, have for their object the fitting of the junior officers for their important duties.

The Drill-Book of 1889 by no means restricts initiative; whilst imposing salutary limits, it implies that under certain circumstances, the normal formation cannot be strictly adhered to; a greater or less amount of front than that laid down will often have to be taken up, as, for instance, when a battalion is acting as an advanced guard. It is necessary, therefore, that troops should be practised in modified form of the attack, and the minds of all be at once disabused of the idea that the diagrams of the Drill-Book are exact models of the procedure to be followed on the field of battle. The spirit of all regulations should be studied as deeply as the letter, and it would perhaps relieve many minds of an incubus were the diagrams to disappear. Moreover, the official recognition of the group system and greater decentralization in the firing-line would most assuredly commend itself to regimental officers. These, however, are but details, important no doubt, but absolutely useless if general principles are not equally regarded. The success of an attack depends, in the first place, on its strength, its power of gaining fire superiority, of taking instant advantage of success, and of progressing rapidly from one success to another. To effect all this, to restore the order and cohesion to the attack which it lost in 1860 and 1870, to substitute for rashness, impatience, and individual fighting, the strength and momentum of concentrated numbers bound together by a discipline which permits no swerving from the line of direction; to do this and thereby revive that "bloody energy of battle" which seeks not the exhaustion but the annihilation of the enemy, our own system, even as it now stands, is far better adapted than the disintegrating methods of the Germans or the fantastic visions of the "Midsummer's Night Dream."

THE KRNKA-HEBLER TUBULAR BULLETS.

From the United Service Gazette, England.

PROFESSOR HEBLER, of Zurich, in a recent number of the *Allgemeine Schweizerische Militär-Zeitung*, publishes some highly important details on the results obtained by the adoption of the tubular bullets designed by himself in conjunction with Herr Krnka. We have already in a previous number given the results of Professor Hebler's experiments with bullets of an improved pattern of ogival head, which show conclusively that a wide field still exists for enhancing the effectiveness of rifle fire by studying the form of bullet best adapted for neutral-

izing as far as possible the resistance offered by the atmosphere. In spite of the almost incredible increased ballistic properties shown by the Hebler solid bullets, the Professor did not despair of attaining yet more extraordinary results from the adoption of tubular bullets, the first experiments with which were commenced in 1874. At that time, however the results were anything but satisfactory, owing to the soft lead, of which the bullets were then made, setting up and becoming deformed by the pressure of the gases before leaving the barrel. The introduction of jacketed bullets, covered with an outer casing of steel or nickel, rendered possible what hitherto could only be regarded as a scientific attempt to minimize the resistance of the atmosphere, more especially as the external envelope and the central tube of the bullet can be made out of one single piece of metal, thus precluding all fear of the missile losing its shape whilst being driven forward along the barrel.

After experimenting with various models, Messrs. Krnka and Hebler decided that the bullet best adapted to overcome the resistance of the air should have the same ogival form in rear as in front; the experiments which are briefly summarized below refer to bullets of that shape. The question of the diameter and shape to be given to the central channel considerably affects the efficiency of the projectile, since it is clear that if the channel is too small the resistance will only be to a slight extent neutralized, whilst, on the other hand, other disadvantages would arise if it were too large. Messrs. Krnka and Hebler have now adopted a central channel two-fifths that of the diameter of the projectile, widening out to a funnel shape at its base. In order to centre the bullet and to allow of the full pressure of the gases taking effect, a light base cup is fitted, which drops out as soon as the bullet leaves the muzzle of the rifle. This base cup fits into the funnel-shaped portion of the channel and insures perfect centring of the projectile.

In comparing the ballistic properties of the tubular bullets with those used in the German rifle, 1888 pattern, two kinds were used, which are classed as "heavy" and "light," the former being filled with hardened lead and the latter with zinc or with an alloy of zinc and copper. The results prove that the "light" bullet is to be preferred, as, although its penetration at all ranges is slightly inferior to that of the "heavy" bullet, its trajectory is flatter, especially at short and medium ranges, whilst there is but little perceptible difference in the deflection when a side wind is blowing between it and the "heavy" pattern. Moreover, the maximum pressure and recoil are less with the "light" than with the "heavy" bullets, and the number of rounds that can be carried by the soldier is necessarily greater. Before proceeding to notice a few of the principal data, it should be stated that Messrs. Krnka and Hebler have taken out patents for their projectiles, and that their adaptation to existing rifles can be effected at a merely nominal cost, as the rifles only require re-sighting and a slight enlargement made in the chamber to allow for the base cup.

In the following tables V. represents remaining velocity in feet; B. 5.7, length of beaten zone in yards for an object 5 feet 7 inches high; B. 5.11, length of beaten zone for an object 5 feet 11 inches high; B. max. 5.7,

maximum beaten zone for an object 5 feet 7 inches high; B. max. 5.11, maximum beaten zone for an object 5 feet 11 inches high; P., penetration in inches against dry deal; D., deflection in feet with side wind of 16½ feet velocity. Where figures or words are given in brackets, they refer to the normal data of the German army rifle, 1888 pattern. The rifling, length, and diameter of shot and cartridge remain the same whatever type of bullet is referred to.

Ballistic data of the perfected "heavy" tubular bullet fired from the German rifle, 1888 pattern:—Length of bullet, 32 mm. (same); length of ogival head, 18 mm.; diameter, 8 mm. (315 in.) to 3.2 mm.; diameter of channel, 3.2 mm., with funnel opening out to 5.6 mm.; length of rear ogival, 12 mm.; diameter of rear ogival, 8 mm. to 5.6 mm.; weight of bullet, 10.8 grammes (14.5 grammes); weight of base cup, .3 gramme; powder charge, 2.75 grammes (same); initial velocity, 2362¼ f. s. (2100 f. s.); recoil, 1.20 m.kg. (1.54 m.kg.); length of cartridge, 82.5 mm. (the same); weight of cartridge, 24.45 grammes (27.5 grammes); number of cartridges weighing 8 lbs. 13 oz. —164 (145); maximum pressure, 2200 atmospheres (3300); B. max., 5.7=803 yards (479 yards); B. max. 5.11=831 yards (492 yards); ballistic goodness of the rifle and ammunition, 1873 (474).

The ballistic data for the various distances are as follows:—

Distance.	V.f.s.	B 5.7	B 5.11	P.	D.
Yards.	Feet.	Yards.	Yards.	Inches.	Feet.
0	2,362	—	—	41	.0
547	2,165	—	—	39	.72
1,094	1,988	199	210	35	3.1
1,640	1,824	127	134	30	7.71
2,187	1,673	88	94	25	15.
2,734	1,535	65	70	21	25.66

The following are additional particulars:—Effective range, 4814 yards; time of flight, 9.16 seconds; remaining velocity, 1105 f. s.; penetration against deal, 11 inches; maximum range, 8859 yards; effective range fired straight up in the air, 2953 yards.

Ballistic data of the perfected "light" tubular bullet fired from the German rifle, 1888 pattern: Envelope of bullet filled with zinc or with an alloy of zinc and tin. The dimensions of this bullet are the same as those of the "heavy" tubular bullet; its weight is, however, only 7.8 grammes, making the total weight of cartridge, complete, 21.45 grammes; the weight of 186 cartridges equals that of 145 of the ordinary German pattern—viz.: 8 lbs. 13 oz. With this bullet the maximum pressure is 1450 atmospheres; B. max. 5.7 = 870 yards; B. max. 5.11 = 886 yards; and the ballistic goodness of the rifle and ammunition 2240 as compared with 450 when the ordinary Service bullet is fired from the same rifle.

XUM

The ballistic data for the various distances are as follows:

Distance.	V.f.s.	B 5.7	B 5.11	P.	D.
Yards.	Feet.	Yards.	Yards.	Inches.	Feet.
0	2 657	—	—	30¾	—
547	2.359	—	—	30	.82
1,094	2,093	215	238	27	3.6
1,640	1,857	136	144	22½	9.35
2,187	1,647	92	97	17¾	18.89
2,734	1,463	64	68	13¾	33.46

The following are additional particulars: Effective range, 4840 yards; time of flight, 9.71 seconds; remaining velocity, 922 f. s.; penetration against deal, 5½ inches; maximum range, 8226 yards; effective range fired straight up in the air, 2739 yards.

II.

In our previous article we gave the ballistic data of the perfected "heavy" and "light" tubular bullets fired from the German Service rifle. We now give the data for these bullets fired from the 5 mm. (.197 in.) Hebler rifle. The figures in brackets refer to data for the 5 mm. ordinary bullet.

Ballistic data of the perfected 5 mm. "heavy" tubular bullet: Length of bullet, 30 mm.; length of ogival head, 17 mm.; diameter, 5.1 mm. to 2 mm. Diameter of central channel, 2 mm., with funnel opening out to 3.6 mm.; length of rear ogival, 11 mm.; diameter of rear ogival, 5.1 mm. to 3.6 mm.; weight of bullet, 4.3 grammes; weight of base cup, .12 grammes (material, hard lead with steel jacket, and central channel lined with steel); powder charge, 1.5 gramme of Köln-Rottweil prismatic smokeless powder with cartridge filled to the extent only of nine-tenths of its capacity; initial velocity, 2966 f. s., as compared with 2615 f. s, with the ordinary 5 mm. solid bullet; weight of rifle, 8 lbs. 13 oz.; recoil, 0.72 m.kg.; length of cartridge with bullet, 72 mm. (2.83 in.); weight, 13.3 grammes; number of cartridges weighing 8 lbs. 13 oz., 301 (276); maximum pressure 2460 atmospheres (3633); B. max. 5.7 = 1024 yards (564 yards); B. max. 5.11 = 1058 yards (575 yards). Ballistic goodness of the rifle and ammunition, 5213 (1429).

The ballistic data for the various distances are as follows:

Distance.	V.f.s.	B 5.7	B 5.11	P.	D.
Yards.	Feet.	Yards.	Yards.	Inches.	Feet.
0	2,966	—	—	33.14	.0
547	2,769	—	—	34.45	.69
1,094	2,585	330	350	34.78	2.88
1,640	2,417	218	232	34.12	6.98
2,187	2,257	159	169	33.14	13.35
2,734	2,106	121	128	30.84	22.44

The following are additional particulars: Effective range, 5905 yards; time of flight, 8.84 seconds; remaining velocity, 1417 f. s.; penetration against

XUM

deal, 17.67 inches; maximum range, 10,937 yards; effective range fired straight up in the air, 3644 yards.

Ballistic data of the perfected 5 mm. "light" tubular bullet. Dimensions same as for "heavy" tubular bullet. The figures in brackets refer to data for the 5 mm. solid bullet: Weight of bullet, 3.1 grammes (5.8); material, zinc or an alloy of zinc and tin, with jacket and lining of central channel of steel; powder charge same as for "heavy" tubular bullet (1.5 gramme), but size of powder grains = .53 mm. instead of .72 mm.; length of cartridge, 72 mm.; weight, 12.1 grammes (14.5); number of cartridges weighing 8 lbs. 13 oz. = 331 (276); initial velocity, 3340 f. s. (2615); recoil, .62 m.kg. (.80); maximum pressure, 1586 atmospheres (3633); B. max. 5.7 = 1113 yards (564 yards); B. max. 5.11 = 1144 yards (575 yards). Ballistic goodness of the rifle and ammunition, 5652 (1429).

The ballistic data for the various distances are as follows:

Distance.	V.f.s.	B. 5.7	B. 5.11	P.	D.
Yards.	Feet.	Yards.	Yards.	Inches.	Feet.
0	3,340	—	—	26.38	.0
547	3,035	—	—	28.35	.75
1,094	2,762	372	394	29.53	3.34
1,640	2,510	223	247	29.92	8.33
2,187	2,283	163	173	28.74	16.37
2,734	2,077	119	125	26.38	28.3

The following are additional particulars: Effective range, 5957 yards; time of flight, 9.38 seconds; remaining velocity, 1187 f. s.; penetration against deal, 8.97 inches; maximum range, 10,180 yards; effective range fired straight up in the air, 3393 yards.

In the last two series the powder charge of 1.5 gramme only filled the cartridge case to the extent of nine-tenths of its capacity. The following data refer to the 5 mm. "light" tubular bullet fired with a full powder charge of 1.64 gramme of Köln-Rottweil prismatic smokeless powder, each facet being of the dimensions of .59 mm., so as to insure perfect combustion. Where not otherwise specified, the details are the same as before, and the figures in brackets refer to the 5 mm. solid bullet. Weight of cartridge, 12.3 grammes (14.5); number of cartridges weighing 8 lbs. 13 oz.= 326 (276); initial velocity, 3546 f. s. (2615); maximum pressure, 2242 atmospheres (3633); B. max. 5.7=1157 yards (564); B. max. 5.11=1118 yards (575). Ballistic goodness of the rifle and ammunition, 5842 (1429).

The ballistic data for the various distances are as follows:

Distance.	V.f.s.	B. 5.7	B. 5.11	P.	D.
Yards.	Feet.	Yards.	Yards.	Inches.	Feet.
0	3,546	—	—	24.8	.0
547	3,225	—	—	27.16	.69
1,094	2,933	414	438	29.13	2.98
1,640	2,667	258	273	29.92	7.38
2,187	2,428	180	191	29.53	14.5
2,734	2,208	132	140	27.95	2.55

The following are additional particulars: Effective range, 6299 yards; time of flight, 9.67 seconds; remaining velocity, 1187 f. s.; penetration against deal, 8.97 inches; maximum range, 10,617 yards; effective range fired straight up in the air, 3539 yards.

III.

In order to appreciate with greater readiness the advantages offered by tubular bullets and to compare their action more easily with the solid bullet at present in use in European armies, Professor Hebler gives tables of the ballistic data of the 11 mm. German rifle 1871 pattern, and of the 7.9 mm. rifle 1888 pattern, the former of which may be taken as fairly representative of the old class military weapon and the latter as the representative of the modern small-bore rifle.

The following are the principal data applicable to the 11 mm. rifle (.433 inch): Weight of rifle, 9.92 lbs.; weight of bullet, 25 grammes; powder charge, 5 grammes; weight of cartridge, 42.8 grammes; number of cartridges weighing 8 lbs. 13 oz.=93; initial velocity, 1443 feet; maximum pressure, 1600 atmospheres; recoil, 1.58 m.kg.; B. max. 5.7=365 yards; B. max. 5.11=370 yards. Ballistic goodness of the rifle and ammunition, 100.

The ballistic data for the various distances are as follows:

Distance.	V.f.s.	B. max. 5.7	B. max. 5.11	P.	D.
Yards.	Feet.	Yards.	Yards.	Inches.	Feet.
0	1,443	—	—	9.5	—
547	837	67	70	7.87	1.7
1,094	590	21	22	4.33	10.89
1,640	453	9½	10	2.36	35.76
1,750	433	8	8¾	2.16	43.63

The following are additional particulars: Effective range, 1751 yards; time of flight, 7.86 seconds; remaining velocity, 433 f. s.; penetration against deal, 2 1-6 inches; maximum range, 3227 yards; effective range fired straight up in the air, 1075.

The principal data of the present German rifle, 7.9 mm. bore (.311 inch) 1888 pattern are as follows: Weight of rifle 8 lbs. 6 oz.; powder charge, 275 grains smokeless powder; weight of bullet, 14.5 grammes (material, hard lead with steel jacket); weight of cartridge, 27.5 grammes; number of cartridges weighing 8 lbs. 13 oz.=145; initial velocity, 2100 f. s.; maximum pressure, 3300 atmospheres; recoil, 1.54 m.kg.; B. max. 5.7=479 yards; B. max. 5.11=492 yards.

The ballistic data for the various distances are as follows:

Distance.	V.f.s.	B. 5.7	B. 5.11	P.	D.
Yards.	Feet.	Yards.	Yards.	Inches.	Feet.
0	2,110	—	—	—	—
547	1,188	126	133	16.93	1.24
1,094	830	44	46	8.27	8.23
1,640	636	20¼	21¾	4.72	27.46
2,187	515	11½	12½	3.23	67.91
2,734	433	7½	8	2.28	140.42

XUM

The following are additional particulars: Effective range, 2326 yards; time of flight, 8.74 seconds; remaining velocity, 492 f. s.; penetration against deal, 2.91 inches; maximum range, 4173 yards; effective range fired straight up in the air, 1391 yards.

A comparison of the data given in this last table with those given in our first article, show the enormous increased efficiency which can be obtained from existing rifles by the adoption of tubular bullets, whilst the same data compared with those given in our second article, show what may be expected by the introduction of rifles of 5 mm. calibre (.197 inch), which are sure sooner or later to be adopted by all European armies.

Assuming the point of resistance offered by the atmosphere to the ordinary German 7.9 mm. solid bullet to represent 1000, Professor Hebler calculates that the resistance can be reduced to the following by the mere adoption of improved forms of bullets fired from the same rifle, viz.:

(1) Resistance offered to solid bullet with ordinary ogival head and flat base = 1,000
(2) Resistance offered to solid bullet with best possible form of ogival head and flat base..... = 541
(3) Resistance offered to solid bullet with best possible form of ogival head and ogival base..... = 216
(4) Resistance offered to tubular bullet with the best possible form of ogival head and base..... = 89

With the 5 mm. rifle, again taking 1000 as the resistance offered to the ordinary solid bullet, the figures for the four different kinds of bullets stand at (1) 1000, (2) 463, (3) 185, (4) 66. It will thus be seen that with the best possible form of projectile the resistance offered by the atmosphere is only one-eleventh or one-fifteenth of that to which the ordinary bullet is subjected.

IV.

Without necessarily accepting the absolute accuracy of the data brought forward by Professor Hebler in favor of the Krnka-Hebler tubular projectiles, it must be admitted that the results claimed are sufficiently striking to merit earnest consideration, whilst it would seem that a very brief practical experience should be sufficient to test the general soundness of the Professor's conclusions. It will be noticed that each type of bullet, "heavy" and "light," possesses certain special merits and demerits, and that consequently the adoption of one or the other will be favored according to the relative importance which is assigned to points of comparative detail. Compared roughly with each other, the "heavy" tubular bullet has greater penetration at all distances than the "light," and it is also slightly less susceptible to the action of a side wind. The trajectory of the "light" tubular bullet, on the other hand, is flatter than that of the "heavy," especially at ranges short of 2000 yards; the recoil and pressures in the bore are also less, and, what should be of considerable import, 186 of the lighter pattern cartridges weigh the same as 164 of the heavier pattern (8 lbs. 13 oz.). The balance of advantages appears therefore to tend considerably in favor of the light pattern.

On looking through the tables which we have reproduced, it will be seen that the penetration of tubular bullets, whether "heavy" or "light," is at

all ranges largely in excess of that of the service bullet at present employed; that the deflection with a side wind of 16½ feet velocity is considerably less: that the recoil and maximum pressures are greatly reduced; that the beaten zones at all ranges are enormously extended, and finally, that the number of cartridges that can be carried by the soldier without increasing his load is materially augmented. All these in themselves are advantages of the most valuable character; but a still further practical advantage remains to be mentioned, and that is the small amount of elevation required to be given to the rifle when tubular bullets are employed. The difficulty of sighting the rifle when firing at long ranges practically prevents its being utilized by the average soldier; when tubular bullets are employed, however, this difficulty entirely disappears, since the elevation required for a range of 1640 yards when using the tubular bullet is the same as that required at 547 yards with the ordinary bullet, using the same rifle in both cases (.311-inch); at 2734 yards the elevation with the tubular bullet is less than that required at 900 yards with the ordinary bullet, and only one-sixth of the elevation required for the same range (2734 yards) with the ordinary bullet. It is quite clear that in any case the elevation required to be given to the rifle at all practicable ranges is so very slight as to do away with all difficulty in long-range shooting. One point apparently that has not been considered is the effect likely to be produced by wounds inflicted by tubular bullets; it will be gathered from this description that the front end of these bullets very much resemble in appearance a couple of gouges or cheese scoops, brought together so as to complete a circle, hence it is probable that they will pass through a human body without any tendency to set up, and that, in fact, the wound caused will be a perfectly clean puncture. If this should be the case, it seems doubtful whether the shock would be sufficient to place a man *hors de combat*, and the result of their introduction might possibly lead to a different conclusion than that anticipated by the learned professor; that is to say, instead of facilitating the still further reduction of the calibres of military weapons, they might have the effect of making it advisable to slightly augment them, more especially as it would appear that a rifle of 8 or 9 mm., firing tubular bullets, would still possess better ballistic properties than the present rifle of 7.9 mm. Probably it will be found that Professor Hebler has not overlooked this view of the matter, and that we shall shortly have further particulars on the action of tubular bullets from the humanitarian standpoint.

XUM

THE "LINING-PLANE" OF THE GERMAN FIELD ARTILLERY.

By Captain W. A. MACBEAN, R. A.

(*From Proceedings Royal Artillery Institution.*)

IN the latest (1892) edition of the German Field Artillery Drill, increased importance appears to be attached to indirect fire, and for the first time its deliberat e employment upon the battle-field finds sanction in the Regulations.

The paragraphs which bear most upon the subject are as follows, and are contained in the chapter upon "Battle."

274. "Direct fire is to be preferred to indirect fire; but the latter will have to be used when the ground or the tactical situation do not permit of direct fire."

So far, the wording of this paragraph is identical in the two editions of 1889 and 1892, but in the latter the following has been added:

"In some cases isolated batteries, covered from view and difficult of discovery by the enemy may, by the effect they produce in a specified direction, afford the means of gaining the superiority of fire."

The following is also new:

277. * * * * "Cover from the enemy's fire and from view may become a necessary preliminary condition for the superiority of our own fire effect."

In the 1892 edition mention is also made for the first time of an instrument termed the "Richtfläche," which is here translated as "lining-plane." According to the drill-book (para. 115) this instrument is to be employed for obtaining the line when the target cannot be seen over the sights, nor from rising ground in rear of the battery, and it has doubtless been specially adopted for use in such stations as are mentioned in the paragraphs quoted above.

The lining-plane consists of a brass base plate, steel sighting-arm, and clamping screw.

The base plate is semicircular in shape; its diameter has a fine edge and is planed quite true. The circumference is graduated in degrees; the graduation begins at at 90° at both ends of the diameter and goes upwards on the right side (the diameter is placed to the front) to 100°, 110°, etc., and downwards on the left to 80°, 70°, etc.

The sighting-arm pivots on the centre of the diameter and is provided with a notch at one end and a pointer at the other, It can be adjusted in any position by means of the clamping screw.

Every gun carries a lining-plane in the trail box. It is employed as follows:

The battery commander designates one of the guns and selects a lateral auxiliary mark, plainly visible to the whole battery and not too near. The gun named is trailed into the approximate line of fire and the position of

the wheels marked. The lining-plane is then placed upon the plane surface on the top of the breech, with its diameter coinciding with the line cut on the gun at right angles to the axis of the bore. The gun-layer then directs the sighting arm on the auxiliary mark, clamps it, and reads off the number of degrees on the base-plate. This reading, say 40, is communicated to the battery commander, who then gives the command to the whole battery: Lining-Plane—Right, Church Steeple, 40. The lining-planes of the remaining guns are then set to the graduation ordered, placed upon the guns and the trails are thrown round until the sights of the sighting-arm are directed on the auxiliary mark. After the first rounds the line is corrected if necessary by altering the graduation (by order of the battery commander) and shifting the trails until the sights of the lining plane are again laid on the auxiliary mark, the instrument being so constructed that each degree gives a lateral deviation of $\frac{1}{10}$ of the range.

Elevation is given by quadrant.

When the line has been obtained, the battery ranged, and fire distributed, the lining-pickets are planted in rear of the guns, which are then lined on the pickets in the usual way.

CHANGES AND PROGRESS IN MILITARY MATTERS.*

By Lieut-General TH. v. JAROTSKY.

Translated from the German by Lieut. A. S. Frost, 25th Infantry.

INFANTRY.

A LITERARY war is still waged over the permissibility of, or necessity for, certain fixed forms for the normal attack. This strife has thus far led to no result because it is impossible to reconcile opinions that differ so radically and because the conditions of a satisfactory explanation, *i. e.*, the fixing of the conditions under which any one normal attack will be applicable, are lacking. The normal attack, or better, normal procedure—for it is concerned with both attack and defense—is not dependent for its applicability upon the ground, so that one can say it is only available in this or that terrain only, but it is entirely dependent upon the tactical situation. Only when similar circumstances occur can a normal procedure be applied which has been settled upon for a definite case. This similarity to previous conceptions is shown, for example, in fortress warfare where a normal procedure is fixed and codified in all European armies. But, in operations in the open field, the battle of masses alone offers the possibility of the employment of the normal procedure, for this is to a certain extent similar to the conception previously entertained.

This normal procedure will only extend to fixed rules for the advance, the deployment, the formation as to front and depth, and the work of infantry and artillery combined; for the rest, it will simply contain an outline

*Colonel von Löbell's Annual Reports upon Changes and Progress in Military Matters During 1892.

of the probable course of the action. This must be evolved from a knowledge of the nature of battle as shaped by the latest instruments of warfare, and be so elastic that it can be easily adjusted to the nature of the ground and to the particular measure adopted by the enemy.

It is not uninteresting to observe and compare how the four leading military states of Europe have treated what may be called normal procedure in their regulations. The following is taken from a treatise in No. 57 of the *Militär-Wochenblatt* for 1892:

1. *Attack.*—All four regulations divide the attack into three parts. The first part is the approach to the enemy's position until the opening of fire. All four regulations require a weak advanced line. The skirmishers advance in one movement as rapidly as possible against the enemy. The Russian and Austrian Regulations lay down 2000 paces for the beginning of the deployment, the German give no distance, and the French say the skirmish line should be thrown out when the enemy's fire makes it necessary. As to the distance from the enemy to which they hope to advance in one movement, the German regulations lay down nothing definite; the French, 700 m.; the Russian, 800 paces; and the Austrian, 1000 paces.

The second part treats of the employment of fire, the attainment of superiority of fire and the advance to the assault. The German regulations let swarms of skirmishers work up to the enemy to gain superiority of fire; no definite distance is given for throwing the supports into the firing line. The Russian regulations order an advance by rushes of the entire skirmish line, or part of it, to within 300 or 150 paces; it assumes that, at the beginning of the attack proper, about 800 paces from the enemy, the supports will be in the firing-line. The Austrians throw out whole companies and advance by rushes to within 500 paces of the enemy; no distance is given for pushing in the supports. The French regulations also orders an advance by rushes by companies or échelons to within 250 metres of the enemy; it gives warning concerning mixing of units, and lays down that the supports will be first thrown into the firing line at about 400 metres from the enemy. All four regulations require the shaking of the enemy by fire before the advance to the assault.

The third part is the "storm" proper. The German regulations lay down no distance for beginning it, they assume that the reserves will be close to the firing-line and the "storm" will be taken up either by command of a general officer or by the initiative of the troops themselves. It substantially agrees with the Austrian regulations except that the latter begins the storm at 500 paces. The Russian fix the storm at 300 to 150 paces, the French at 250 to 200 metres from the enemy.

After a successful assault all four regulations follow the enemy with fire. The French regulations require a repetition of the assault in case of failure!

2. *Defense.*—All four regulations make fire action and a corresponding use of the ground a main principle of the defense.

The German regulations follow the firing regulations; the Austrian want the fire to be confined to the mid and short ranges and only delivered at long ones when the target is large and ammunition is plentiful. The

XUM

French open the fire as soon as the enemy can be hit; the Russians wish the fire to be gradually developed. All except Germany recommend volleys.

Concerning choice of position and the dispositions for its defense, all four regulations are in the main agreed. They are as follows: Laying out the intrenchments, shortening the depth, holding trench reserves in readiness under cover, occupying the position in sufficient strength as soon as the direction of attack is discovered, and retaining a separate body as a principal reserve, when possible behind a wing.

The German regulations emphasize the usefulness of pushing in the main reserve from the side, and forbid its retention to cover the retreat; the main reserve should accomplish a decisive result.

The German and Austrian regulations desire an offensive return only when a decisive result is intended; the French require an offensive return under all circumstances; the Russians only when the enemy is too far exhausted to execute the assault.

From this comparison of regulations it is seen that, while they are in full accord as to general principles, there is a not unimportant difference of opinion regarding the conduct of the battle. Perhaps when these regulations have stood the test of fire in a great war a greater similarity of views will be observed.

The war in Chili in 1891, which was conducted in part with arms of the latest construction and according to modern ideas, cannot be used in the formulation of rules from the experience of war, because the conditions differed so widely from those of Europe.

The question, hitherto only put theoretically, whether it is more advantageous to prepare the battle and attack with dense or thin lines of skirmishers, might be placed in the way of solution by practical experiments in musketry. While it is true that the results on the target field have no absolute value, yet they have a relative one and may be of assistance in forming an opinion concerning the comparative advantages of this or that formation.

B. Influence of Smokeless Powder.—This question has been treated with greater calmness and consequently ideas are more in unison. It is now held that smokeless powder will not work such a change in the conduct of battle as was at first supposed.

The increase in the power of infantry fire by the absence of smoke affects the attack and the defense in equal degree, and will therefore cause no important change in the battle tactics of infantry; but a careful training of infantry in musketry has become of greater value than ever before.

C. Influence of Small Calibred Small Arms.—The value of this weapon consists in that its range, flatness of trajectory, accuracy and penetration are very much increased. All of these qualities favor the defense more than the attack because attacking troops are more exposed and offer a better mark than those on the defensive.

The defense will, as hitherto, usually be able to select or throw up cover while the assailant will be forced to begin his preparation earlier—*i. e.*, at greater distances,—than formerly, and the first lines of the supports, will, where the ground affords no cover, be held further to the rear.

XUM

It will further be necessary to post infantry which supports artillery further in advance than hitherto, *i. e.*, 700 to 1000 metres in front of the artillery position. The great penetration of the small-calibred bullet seems to justify the theory that, within its effective zone, only formations of little depth (single rank) can be employed; still, this is open to the objection that that sort of formation is unmanageable, does not favor the best use of the ground and gives rise to grave doubts as to battle discipline. In any case, the time is not ripe for rules, and therefore none of the great military powers have expressed themselves officially.

D. Light Infantry in Advance.—In a few countries the noteworthy attempt has been made to use a specially selected and trained body of troops to reconnoitre and annoy the enemy during the opening of the battle and in advance of the regular troops.

Russia has gone farthest in this matter and has organized light infantry (Ochotniki) for this purpose.

The French seem to have given a similar rôle to the *groupes francs*. Upon this, as well as the proposition to employ the German light infantry in the same way; there is an article worthy of mention in No. 63, of the *Militär-Wochenblatt* for 1892.

In any case, in view of the great difficulty the cavalry will have in reconnoitring effectively owing to the general use of smokeless powder, it may be desirable to train for this service, not special corps indeed, but the whole mass of the infantry.

E. Manœuvres with Ball Cartridges.—This kind of manœuvres, or great shooting exercises, with mixed arms, was practised in three armies in 1892.

That of Germany occurred between Karlsruhe and Pforzheim on August 18. Troops of the XIV. Army Corps, four battalions, four squadrons, and five batteries, took part in deploying on a front of 3 km. The result of the shooting was very satisfactory.

In Russia a similar manœuvre was held in the vicinity of Warsaw. 14 battalions of the the 3d Infantry Division of the Guard and 92 guns (includ- 24 field mortars) took part. The front extended for 5 km. (5468 yds.) The infantry was not more than 400 metres in front and 500 metres to the flank of the artillery firing-line. The artillery fired 1448 cartridges, the infantry 15 per head. The results, in spite of previous fatigue, (3½ hours' march) were very satisfactory.

There was a similar practice in Switzerland near the fort of St. Gothard in the middle of September. A reserve battalion, a Landwehr field battery, a heavy artillery company and a sapper company took part. The heavy guns of Fort Airolo and the mountain and Maxim guns, fired over the heads of the infantry. In spite of the fact that the artillery occupied commanding ground, some of the shrapnel fell into the ranks of the infantry; but, luckily, no injuries are reported. The results were remarkably good.

These exercises are of little tactical value because a warlike employment of the troops (infantry in advance of or in the artillery firing-line) is not practicable from peace considerations.

F. Battle Tactics—March Tactics.—As may be seen from military literature, battle tactics occupies the principal place in the thoughts of the

military; from its great importance, its dramatic interest as it were, it has to a certain extent become the "daily bread" of the practical soldier. From this condition of things that important branch of tactics, the tactics of the march, does not receive the attention it deserves; still it must be admitted that the raising, assembling and moving of the great masses, upon which we must reckon in the next war, offer problems in marching tactics which are quite new, and for the solution of which little of a practical nature can be done in time of peace, and what *is* done will be theoretical at best. The object of these lines is to call attention to this.

II. INFANTRY TACTICS IN THE DIFFERENT ARMIES.

A. Germany.—In Germany the conviction is more and more gaining ground that more must be done than ever before in training infantry for that conflict of masses, the battle.

It is high time; for there can scarcely be any doubt that the decisive mass conflict is the most important action of war because it determines the fate of the campaign and has its own peculiar phenomena which must be learned during peace manœuvres. For this purpose it is not necessary to manœuvre large bodies of troops. A regiment, yes, even a battalion or a company could exercise according to battle conditions if they would observe their proportional extension of front, and conduct the exercise with due regard to the arrival and coöperation of the artillery and a correct appreciation of the tactics of this arm.

When these manœuvres are of frequent occurrence, the above-mentioned normal procedure will be formulated, and then will be the time to lay it down in regulations.

To a pamphlet by Lieut.-General v. Mantey, published this year by E. S. Mittler & Son, is due the credit of clearly pointing out the necessity for formulating and explaining the principles of the mass conflict.

Based upon approved methods of careful individual instruction in rifle-firing, the Germans are seeking to improve the warlike training of the infantry in musketry.

The school of musketry is especially mindful of this great problem and accomplishes much in this direction. Here warlike conditions govern everything: the taking up of the position, the ranges, the kind of target. The target ranges and appurtenances at its disposal support, in a high degree, the warlike character of the exercises. When one witnesses all this he is unable to suppress the wish that this ideal warlike practice were possible for the entire German infantry. It must be acknowledged that army headquarters does all that is possible for the attainment of this end, especially by providing the means for an extensive supply of practice ammunition to the troops and the establishment of great target ranges.

B. France.—In France, too, battle tactics is the chief subject of interest. An important book upon this subject has been published by Colonel de Ponchalon.* He proposes the following: The infantry of the advanced guard to annoy the enemy's artillery by volley-firing; the more accurate reconnoissance of the enemy's position to be undertaken by the cavalry and

* *Nouvelle tactique de combat.* Paris, 1892.

infantry. He recommends dense skirmish lines, the men arm to arm, mixing of companies among one another to be avoided as far as possible. The supporting troops advance in one rank, the firing line as rapidly as possible, and, if possible, without halting up to within 600 meters of the enemy; the fire is first opened at this distance and from this point the attack proper will be developed. The reinforcements arriving from the rear must always carry the firing-line forward; the author, however, looks upon this as very difficult; for when the firing-line has become too dense there will be unnecessary losses. In any case the courage of the soldiers must be promoted in quite another manner than hitherto; for this purpose the "moral training" of the troops is of the greatest importance.

Colonel de Ponchalon expects nothing from the rapid fire at 200 to 250 metres. After a successful assault the pursuit will only be by fire; retreat means annihilation to the conquered.

Long range fire has fallen in the estimation of the French. It is no longer desired in the offensive, with the exception of volleys against the enemy's artillery. On the defensive volleys are allowed up to 1200 metres, but at greater distances it is declared to be waste of ammunition. They promise more from the fire of good single shots. Worthy of mention if not of imitation is a proposal of General Buisson. He wishes to invent a kind of fire, *an unaimed fire during the assault.* The weight of the piece is to be held by a rifle-frame attached to the right shoulder, the piece itself is to be held with the right hand, so that it will be pressed against the body below the nipple. From this horizontal position the weapon is to be continually fired during the assault; at first a single-rank skirmish-line is to advance, then a second at a distance of 15 paces and 15 paces in rear of this the reserves are to follow in close order.

From this it is seen that in France the search for a normal-procedure has had peculiar results.

The catastrophe of 1870 taught the French that it is better to speak the truth, even if it does wound the vanity, than by self-praise to deceive one's self and the fatherland as to the true state of affairs. Therefore French military journals comment upon present experiences with great freedom. By comparing the opinions upon the manœuvres, which French professional men publish in the military journals, one gets a tolerably correct idea of them.

C. Great Britain.—In the new Firing Regulations the following appear:

On ground falling rapidly toward the enemy the back position will be used so that the head will be higher than the feet.

As volley firing agrees with British traditions it is especially commended. Magazine fire will only be delivered upon the order of a higher commander. (than the chief of platoon).

In the attack, the fire is delivered by platoons advancing 40 or 50 paces, then halting to deliver volleys, again advancing, and so on.

The ideas mentioned are more distinguished by singularity than by suitability to war.

D. Russia.—What is said of France applies also to Russia. Here also

XUM

battle tactics are the chief subject of interest and they seem to follow national lines of development strictly.

An interesting treatise upon infantry attack will be found in the *Voennii Sbornik*, No. 4 (By Baikoff).

The deployment into order of battle will be made at three to four versts (3500 to 4666 yds.) from the enemy. As it is foreseen that the cavalry will not bring sufficient information regarding the position of the enemy, it is to be the duty of the light infantry (Ochoniki) to gain a more accurate knowledge. The light infantry of all the battalions of the advanced guard will be thrown out and distributed along the whole front of the attack. Half will be formed into patrols and the other half into patrol supports. These light troops should approach to 1000 paces of the enemy's position, and, when possible, still nearer; they will then throw themselves forward, examine everything carefully, draw the enemy's fire and send back accurate information.

Everything possible should be done to diminish the losses of the assailant, such as clever use of the ground, and the use of thinner formations with greater distances between them.

The following is the attack of an advanced guard regiment according to the views of Baikoff.

The attack first begins when its own artillery has gained a marked superiority of fire over the artillery of the defense; it will be best begun when the artillery has effectively bombarded three trenches of the enemy. As soon as the commander of the assailing force is convinced that the enemy is shaken, he gives the order to attack, which must now be executed as rapidly as possible. The advanced guard regiment is divided into two lines of two battalions each. The two battalions of the first line throw out two companies each in an advanced line, the other companies forming the main line.

When the companies of the advanced line are 3000 or 4000 metres from the enemy, they throw out a thin chain of skirmishers (about one or two groups per company) and the first échelon of half companies follows in support 300 to 400 paces in rear, in single rank, the men at arm's length from one another. The support pushes reinforcements into the firing-line according to its losses.

The second échelon of half companies follows 500 paces behind the first in the same formation. 1000 paces in rear comes the first échelon of half-companies of the main line, with intervals of 500 paces; and 500 paces farther in rear the second échelon of the main line follows. Each leading battalion of the advanced guard has a breadth of 750 paces and a depth of 2000 paces, neglecting the distance between the first échelon and the skirmish line.

1000 paces behind the main line are the last two battalions of the advanced-guard regiment with intervals of 500 paces between the companies, which are in an open double-rank formation.

The regiment therefore has a front of 1500 paces and a depth of more than 3000 paces when formed for the attack. Looked at from the side of the enemy we first see a thin chain of skirmishers, then four half companies in an extended single-rank line; 500 paces farther in rear four more half-

XUM

companies in the same formation, then, at 1000 paces distance, four half-companies and, 500 paces farther, four more half-companies, all in an extended single rank.

1000 paces farther to the rear appear the eight companies in an extended double-rank, but with considerable intervals and in two lines. If these two lines are placed 500 metres apart the depth of the regiment is increased by that amount.

Baikoff has little faith in the effectiveness of the assailant's fire; he also believes that the assailant's estimation of distance will be limited by the eyesight of the men and will only yield medium results. Consequently, he very correctly gives the preparation of the attack over to the artillery and hopes that the attack will first begin by order of the highest commander, and then only when the latter can clearly see the effect of his artillery fire. Until then the light infantry only will be advanced.

At the beginning of the attack, fighting patrols will be sent out on the flanks. Baikoff is of the opinion that the assailant's fire will first take effect at about 600 or 700 paces from the enemy. He wishes this to be the principal firing-point. The spirit of the attack also requires that the troops be brought forward from the initial point (3000 to 4000 meters from the enemy) as rapidly as is possible, with due regard to the preservation of their physical and moral strength, to the principal firing-point. For this, Baikoff says the following are the most essential conditions:

1. A good beginning.
2. A rapid advance making use of all cover.
3. The precaution not to make the skirmish-line denser than is absolutely necessary.

During the advance the distances between lines gradually lessen; the foremost lines replacing the losses in the skirmish line; but only by order. The advance of the rear lines proceeds without interruption or halt. Baikoff does not believe that every individual officer under fire will always give the correct order, and therefore demands a strict normal attack in which everything is executed by command. Up to the principal firing station, he wishes a very thin skirmish line; from here on it will be more dense, but at the most will have but one man to two paces. The four leading half-companies will only find themselves in the firing-line when the losses have become tolerably great.

Baikoff emphasizes the importance of looking after the physical power of the men. He says it is nonsense to try to prevent the men from lying down in the skirmish line. In peace this is easy, of course, but, under fire, the instinct of self-preservation will be so strong within the individual man, that lying down cannot be prevented.

Whenever the skirmish line lies down it will always be carried forward by throwing in reinforcements from the rear. This should be done by command, however; when these reinforcements have arrived within twenty or thirty paces of the skirmish line, the officers will sound a shrill whistle and at the same time the command "cartridges out" will be given in the skirmish line, then all will spring up and move forward with the reinforcements.

To attain this in war he asks for zealous practice in peace. The strictest order must govern, each man going straight to the front; base squads will be designated in the firing-line and will give the direction and alignment throughout. The men must be made to understand that the great object "to escape without a scratch" depends upon the speed with which they reach the enemy; further, that the man lying down offers a very large horizontal target to the enemy's bullets, that all crowding together behind cover only increases the losses, and, finally, that a retreat means certain death.

Under effective fire the leading lines will follow in rushes of 100 to 200 paces, taking care to reëstablish order and direction at each halt. The rear subdivisions may, under certain circumstances, pass from one cover to another, man by man. Everything will be governed by the nature of the ground. Mixing of units will be zealously practiced in peace.

During the advance of the advanced-guard regiment the principal reserve follows at 1000 paces behind the last échelon of the second line. Baikoff believes that on arrival at the principal firing station the leading 8 half-companies will be in two échelons, *i. e.*, in a skirmish line and a support following at 300 to 400 paces in rear. The original depth of 2000 paces will then be reduced to 1000 paces, the distance between that and the 8 half-companies of the main échelon will be reduced also.

Baikoff thinks the two rear battalions will now be from 1500 to 2000 paces from the skirmish line. He promises little result for the fire from the principal firing station. The halt in the principal firing station will last only until the arrival of the supporting troops. The single loader only will be used, but rapid fire will be given. The enemy is to be showered with lead but without using the magazines. During the rapid fire the main reserves come closer and, from now on, hard and fast rules cannot be given.

In any case, the skirmish line must be carried forward by fresh reinforcements in spite of all losses. Later, in the simultaneous assault the advance of the base subdivision gives the signal for the advance to all skirmishers. Now the rushes are shorter, from 100 to 150 paces, and again the rapid fire is delivered but the magazine fire is still withheld. As soon as the échelons of the two leading battalions are wholly used up in reinforcing the skirmish line, the first échelons of the last two battalions become the supports. And so it proceeds up to the last firing station—200 to 300 paces from the enemy. Here magazine fire will be first used.

Meanwhile, everything in rear advances without interruption, throwing the fire line constantly forward by fresh reinforcements up to the last firing station.

The success of the attack depends upon:

1. Passing through the zone up to 700 paces as rapidly as possible, in the best possible order and with the fewest possible losses.

2. The execution of the attack in the last stages with coolness.

Fire discipline is of the highest importance. Volleys at long distances can easily degenerate into individual fire, the individual firing of the best shots may easily be taken up by the others and lead to a waste of ammunition. Therefore, until the arrival at the principal firing station, all fire will be suppressed as much as possible; but if the fire is absolutely necessary it

will be given by command of the chief of platoon. Only when especially favorable targets are presented to the attack, will a lively fire be delivered before reaching the principal firing station.

The assault is made from the last firing station—200 to 300 paces from the enemy. Here the flanks must be well looked to and precautions taken against flank attacks; to secure against these, reserves are to be écheloned upon the outer flanks. These reserves must also ward off cavalry attacks.

During the advance, the supports must never run forward at the same time as the skirmish line, so that the same bullet will not hit both targets. The last advance of the skirmish line to the storm is started in the usual way, fresh reinforcements carrying it forward. In this movement individuals should rush in advance of the line and fire. The reserve proper will first fire when the assault has succeeded and the enemy is in flight.

Baikoff lays the greatest stress upon the ability of the officers and non-commissioned officers. Superiors and subordinates will be prepared by a most careful peace training. From the enlisted men he requires blind obedience and the greatest attention; he places little value upon individual independence.

The *Voennii Shornik*, in its eighth number, published a reply to Baikoff's work from the pen of Ssacharoff. The latter maintains that the advance by rushes dissipates the men's strength and wears them out, he would have the advance made in step only. Ssacharoff is a confirmed enemy of the loose order. He believes that the closer the skirmish line approaches the enemy, the longer the halts will be. According to Baikoff, portions of the supports are continually being used to push the skirmish line forward; Ssacharoff believes that this will cause disorder and a premature expenditure of the reserves.

The assailant will in the main know nothing of the effect of his fire. He will advance in close order entirely, and without any preparation of the attack by musketry; he will leave this preparation exclusively to the artillery. Only a few companies of the main reserve will be thrown in advance in order to fire volleys at the artillery of the defense; these companies will rejoin the reserves later in the fight Otherwise the assailant will advance without any preparation by his own musketry.

It is worthy of mention that both writers, although in other respects opposed, are agreed that no confidence is to be placed in the independence of the single man. The Russian recruit is especially adapted for use in closed masses where he is relieved by his commander of the burden of thinking; he bears fatigue and deprivation surprisingly well; but he will never be successfully trained to independent action in the skirmish-line, For this reason the Russians expend an astonishing amount of care on the training of the light infantry, also of the 64 selected men of the regiment. These light infantrymen have a special duty and, of course, receive a high training for it. The whole gist of modern infantry fighting lies in the best possible training of every individual man in independent action as a skirmisher.

In this respect, the Russians are notoriously backward; and they themselves have no hope of supplying the deficiency in any conceivable period of time.

XUM

PRIVATE INDUSTRY IN ORDNANCE MANUFACTURE IN FRANCE. THE CANET SYSTEM.

[*From L'Artillerie Actuelle, en France et à l'Etranger.*]

By Colonel GUN.

Translated by Lieutenant Alvin H. Sydenham, 5th Artillery.

IT is, in our opinion, useful to warn the reader against the current impression which causes Krupp in Germany and Armstrong in England to be regarded as the exclusive furnishers of foreign countries with engines of war.

It is true that these two constructors were the first to produce truly powerful cannon, and their reputation, that of Krupp especially, was perfectly justified at the time in which it was established.

Until recently the first was in correspondence with the entire world, and the second armed especially the South American republics and the countries of the extreme East.

But little by little foreign countries became tired of the faulty constructions of Armstrong and the accidents happening to the English service guns.

Besides, Krupp has increased the power of his guns but little in the past several years; he has continued to maintain that his fermature was superior and that his steel was the best in the world; yet he permitted no one to verify this last assertion. He has daily lost his partisans until now there are few countries which do not actually prefer the interrupted screw fermature to the prismatic block.

While the English and the Germans were arming the greater part of the countries of the world, the French were sufficient unto themselves and labored zealously with the questions of artillery. The government, which for many years entrusted the fabrication of a part of its guns to private industry, has given constructors a chance to improve themselves; it has educated them and accustomed them to satisfying the extremely severe requirements of the artillery committees.

Hence French industry has found itself at a good school, and has been preparing through a long period of time to enter the struggle with the English and the Germans.

It had the metal, the plant, and the acquired experience.

The system of fermature was excellent and it has progressed resolutely to the front.

The Cail establishments, under the direction of Colonel de Bange, which have taken such a prominent part in the reorganization of regulation field material, have delivered several field and mountain batteries to foreign countries.

Le Creusôt and St. Chamond continue, as in the past, to manufacture guns only upon the plans of French officers. But they have made a great

advance in the fabrication of shells and armor plate, and their productions are now known throughout the entire world.

La Société des Forges et Chantiers de la Mediterranée, which has for a long time built guns for the French War and Navy Departments and for the armament of the ships that it builds, was induced to create seven years ago (1882) a special artillery service, the first of the kind in France. Orders were received from all parts of the world.

It is thus that France entered the lists some years ago, and that its establishments for the fabrication of artillery have been able little by little to take rank by the side of Krupp and Armstrong.

It seems interesting to us to study one of these French establishments, with regard to the manufacture of the complicated material of war. This will be a sort of monograph intended to show how far this special branch of construction has progressed by means of private industry, of which the freedom of action is complete and untrammeled.

In order that this study may be complete, it is necessary not to study a metallurgical workshop, making the steel for cannon, nor an assembling plant which does nothing but build service guns upon the plans of artillery officers, but a productive establishment having plans, systems, and methods of its very own.

It is necessary to choose not only a manufacturer limited to putting the tubes upon the lathe, but an artillerist capable of conceiving a gun, of making the design for it, of executing it, and being able afterward to justify calculations previously made and announced, by clear and exact trials.

This choice is necessarily limited to two establishments, the Cail shops, and the *Forges et Chantiers de la Mediterranée.*

We have not chosen the de Bange material manufactured by the old Cail establishments, because every kind of publications have familiarized the public with it, and there is nothing new to say on the subject. Colonel De Bange has in fact produced very little for several years. We are under obligation to him, it is true, for the service field material used in France, which at the time was a very important advance; but if France renews its armament, it will certainly adopt a material at once lighter and more powerful.

The Cail establishments have made both field and mountain pieces, but they have not built any very powerful guns.

Colonel de Bange enthusiastically advanced the employment of bi-conic hooping. We have seen that experience has not confirmed his theories.

We believe that there is more interest and accuracy in taking as a type the service artillery of the *Forges et Chantiers de la Mediterranée*, and it is to this therefore that our study will refer.

The experience acquired by this company goes back to the time of the Franco-German war, more than eighteen years (from 1889).

Toward the end of 1870 the French government called upon its resources and its experience already acquired in construction and entrusted to it the fabrication of part of the field material which was necessary for carrying on the war.

The company hastened to employ its personnel and to adapt its power-

ful plant to the execution of these orders. 300 guns and 1200 carriages were turned out of its workshops in a few months.

Desirous of assuring for the future the aid of the means of production which were at the disposal of the company, the French government has not ceased since that time to entrust important orders to the shops of the *Forges et Chantiers.*

But in the presence of the growing extension given to armaments in all countries the company was unable to limit itself to manufacturing guns, carriages and projectiles of the regulation French types; it wished to supply all armies with its constructions, to create designs for cannon that would fulfil the conditions of a given programme; in fact, it sought to be able to respond to demands for material of every description, whatever might be its importance.

M. Canet, a former co-worker with M. Vavasseur, is one of the most distinguished engineers. Seven years ago, as was stated above, he organized a special system of artillery, complete in every respect; and since that time the company has not hesitated to erect at great expense, a group of workshops devoted exclusively to the fabrication of the material of war.

These workshops are annexed to the factories and shipyards of the company at Havre; they are provided with a plant which unites the greatest power with the most advanced refinements of construction.

This new installation has placed the company in a position to build under the best possible conditions, guns of every calibre, from the mountain cannon of 100 kilogrammes, to the sea-coast or naval gun of 100 tons, either of the types prescribed in France or in foreign countries, or of the Canet system which is peculiar to itself.

The installation is completed by the creation of a proving-ground pertaining to the company, which permits trials of guns and carriages to be made under all angles of fire, and with all precision desirable. It is moreover the only French artillery establishment possessing a polygon affording a range of 20 kilometres (12.427 miles) and upwards.

The guns, ammunition, and carriages, are made by the company in its special workshops at Havre. The armored turrets and hydraulic carriages for guns of large calibre, are constructed in the shops and ship-yards of Marseilles and La Seyne.

The various shops and ship-yards employ about 6000 workmen. The location of the establishments at Havre, at Marseilles, and at La Seyne is exceptional. It permits the armament of ships to be made on the spot, and assures direct communication with foreign nations through the British Channel, the Ocean and the Mediterranean Sea.

This system of artillery has developed very rapidly, numerous orders have been filled for various governments, and it has been demonstrated that French industry can compete upon an equal footing with the powerful German and English artillery establishments which thus far seem to have acquired the monopoly of this kind of construction.

Spain, notably, addressed the company *des Forges et Chantiers* when it wished to proceed with the re-armament of its fleet, and in the shops at Havre were constructed a great number of the guns and carriages for the

new Spanish ships. The guns were of the Hontoria system, established in Spain.

Greece and Japan, which thus far have always ordered from Krupp, have adopted the Canet material, and addressed their last orders to the *Forges et Chantiers.*

The following table, by enumerating the orders given them up to January, 1888, will give some idea of the extent and power of the establishment that we are studying.

Guns.—For the French government: 1800 guns, among which were 36 of 32 centimetres and 43 tons, and 14 of 27 centimetres and 27 tons; 2 guns of 15 and 24 centimetres for the factory at La Creusôt; 12 guns for China; 14 guns for Japan, of which 3 were of 32 centimetres and 67 tons; 25 guns for Greece, among which were 9 of 27 centimetres; 133 guns for Spain; 10 guns for Portugal; 5 guns for Hayti; 20 rapid-firing guns.

Ordinary Carriages.—About 1350 carriages for the French government; 14 carriages for China; 14 carriages for Japan; 5 carriages for Hayti; 28 carriages for Portugal; 133 carriages for Spain; 21 carriages for Greece.

Hydraulic turret mountings.—4 carriages and movable turrets for guns of 27 centimetres for the gunboats *Acheron, Styx, Cocyte,* and *Phlegethon;* 4 barbette turrets for guns of 34 centimetres for the French armor-clad *Le Marceau;* 4 barbette turrets for guns of 28 centimetres for the Spanish armor-clad *Le Pelayo;* 3 barbette turrets for guns of 27 centimetres for the Greek government; 3 barbette turrets for guns of 32 centimetres for the Japanese harbor-defense vessels, *Matsushima, Itsukushima,* and *Hashidate.*

Torpedo Guns.—47 torpedo guns for the French navy; 20 torpedo guns for Japan; 2 torpedo guns for Turkey; 2 torpedo guns for England; 2 torpedo guns for Russia; 10 torpedo guns for Roumania.

In all about 2000 guns, 1600 carriages for all kinds of service by land and sea, 91 torpedo guns. Altogether orders to the value of more than 50 millions of francs.

Guns of the Canet System.—This artillery material comprises the full range of ordinary calibres. In each calibre there are several types of gun, differing in the length of the bore, offering for variations in the charge, a great variation of range and powers. Each one of these recently established types has been benefitted by the progress of recent years, which bears as much upon the perfection of the design as upon the new powders.

The guns are made entirely of steel. The metal is mild, very elastic, and susceptible of marked elongation. Relatively hard steel is used for the breech screw only. The steel satisfied the general conditions of acceptance of the French navy. Each one of the constituent parts is tempered with oil and re-heated; and the manipulations that the steel ingot is made to undergo have more influence upon its final quality than has the operation of casting itself, which is by the crucible or Siemens-Martin furnace.

Each gun is composed of a tube reinforced by a jacket and one or two rows of hoops. A special arrangement of the different parts enables the guns to present equal resistance tangentially and in the direction of the axis of the bore, with complete solidity between the trunnion-ring, the

tube, and the jacket. These elements have as far as possible a uniform thickness. This last point has special importance in that it permits the execution with all care and efficiency of the various operations of hammering, and re-heating.

There has been adopted an enlarged chamber, permitting the firing of heavy charges, by employing special slow powders, giving, with low pressures, high initial velocities.

The fermature of the breech is secured by an interrupted screw which unites all the successive improvements that have been added to this mechanism. The breech-block is provided with a plastic obturator of a peculiar design, which does not yield to the shocks of manœuvre. The obturation is more perfect and more certain than with the metallic rings. The firing mechanism, which is formed of a bolt with a hammer and firing-pin carries a safety device which absolutely prevents the inflammation of the charge.

1. As long as the threads of the breech-block have not come to bearing throughout their length with those of the hollow screw of the breech;
2. As long as the firing bolt is not absolutely in place;
3. As long as the lanyard is not pulled.

Any accidental falling of the hammer is thus rendered ineffectual. The form of the breech-block has been modified in such a manner as to simplify the parts and render their repair more readily accomplished. The manœuvre is simple and can be performed with little effort. When the breech is locked, all turning motion is impossible. When the block is withdrawn from the gun it is borne upon a console provided with a safety lock, and swings upon a hinge. The manœuvre of the blocks of guns of large calibre is accomplished by means of gearing and rapid screws.

A crank placed upon the side turns a shaft, which, by means of transfers, acts upon a vertical endless screw engaging a guide borne by the breech screw. During this movement the locking sectors are disengaged. As soon as the block is free it is drawn backward by a pinion acting upon a rack placed along one of its elements. As soon as the block is completely withdrawn upon the console, a locking stud which holds this latter becomes free, and an arrangement of gearing turns the console on its hinge and throws it around to the side. This block is provided, as usual, with a triple safety device. All its movements are executed automatically one after the other by continuously turning the manœuvring crank. This crank can be operated by hand, or by hydraulic arrangements. The manœuvres, even by hand are easy and rapid.

Ammunition.—These guns fire five kinds of projectiles: penetrating shell, ordinary shell, ball shrapnel, case shrapnel, and ordinary case-shot. The penetrating shell is of hardened cast-iron, of ordinary steel, or of chrome steel. This last quality, of which the French factories have the monopoly, alone combines the necessary conditions for fire against compound and all-steel armor plates.

The ogive is elongated in order to give a greater power of penetration.

The ordinary bursting shells are of cast-iron; they contain a heavy bursting charge. The ball and case shrapnel are made with a steel envelope. In the former the balls are placed around the circumference, the bursting charge being distributed along the axis. In the second the balls are placed in layers separated by cast-iron discs, which, being broken in the process of manufacture, greatly increase the number of fragments. All projectiles are fitted with a copper rotating band. The case-shot have an envelope of hardened zinc, the interior of which is filled with balls of hardened lead.

The weight of the projectiles is less than that of the German shells. The trajectory is thus flatter without the striking energy being decreased in an appreciable degree; furthermore, at a given range, on account of the flatness of the trajectory, the projectile can strike the armor plates under an angle of incidence more nearly normal, and thus under conditious more favorable for penetration.

The fuses are either percussion or combination, regulated to suit the high initial velocity of the projectiles.

The cartridges are wrapped with stiff serge. They contain a special brown powder adapted to each calibre.

The obturating and percussion fuses are of easy management. They are subject to neither failures or miss-fires.

The advantages of these guns are the following:

Elements of excellent quality affording a maxim of guaranties by a succession of tests which the metal must satisfy before being put to use.

A better combination of these elements than in other systems, especially on account of the great longitudinal resistance given to the gun.

Excellent obturation by means of a modified plastic obturator, which does not admit of jamming and stiffness.

Greater facility of manœuvre than with the cylindro-prismatic block.

During the combat, a better protection of the men serving the piece and of the breech and firing mechanism than in the prismatic block system.

The employment of a primer more simple than in the English needle system, and more rapid than in the German screw system, of which the adjustment is long and often difficult.

Very great rapidity of fire in consequence of the facility with which the breech-block can be manœuvred and the primer changed.

The safety mechanism affords important guaranties. The German system makes no provisions of this nature, although the necessity for them has been demonstrated by the accidents which have happened in service.

Finally the ballistic elements have been combined with care; the weight of the projectile and the charge are well suited to the calibre and to the diameter of the chamber.

For equal weights the Canet guns have greater power of penetration. Their performance shows that the best adaptation has been made of the metal of the gun and of the powder.

It seems necessary to give a few figures indicating the results attained. We have been furnished with official reports, published by the *Revue d'Artillerie*, of the firing record obtained with these guns.

The guns of 12 cm. and 16 cm. of 30 calibres, tested in 1886, gave veloci-

XUM

ties of 620 metres (2034 ft.) to projectiles of 21 and 54 kilogrammes (46.3 and 119 pounds). The guns of 15 and 24 cm. of 36 calibres (model 1885), tested in 1887, gave to projectiles of 40 and 166 kilogrammes (88 and 365.3 pounds) initial velocities of 685 metres (2247.4 feet) and such a power of penetration that these projectiles pierced 30 and 62 centimetres (11.8 and 24.4 inches) of forged iron.

These guns were of the 1885 model. Since that time many improvements have been perfected. By modifying the form of the chamber, by changing the ratio of the weights of the charge and projectile, M. Canet has succeeded in obtaining very much higher velocities. There is now in process of construction for Japan a few guns of 32 centimetres and 38 calibres which will give the projectile an initial velocity of 700 metres (2296.6 feet).

Krupp exhibited in 1885 as a result most gratifying in his estimation, the record of a 24 cm. gun which gave with the same charge of 90 kg. (198 lbs.) and a projectile of 215 kg. (473 lbs.) an initial velocity of 574 metres (1883.2 feet). It is evident that the Germans have reason to be disquieted within themselves and to inquire whether Krupp will long preserve his monopoly.

CARRIAGES FOR NAVAL SERVICE (CANET SYSTEM).

Carriages with inclined chassis.—Those which are designed for naval service may be placed upon the deck, in the batteries, in armored turrets, or between decks. According to the position of the gun upon the ship, the amount of space disposable, or the field of fire which it is desired to cover, the carriage may be central or front pivoting.

Each carriage comprises three distinct parts; the carriage proper, the chassis, and the bed-plate.

The Carriage.—The carriage proper supports the gun upon its trunnions. It rests upon the inclined slides of the flasks of the chassis or upon rollers situated in the upper part of the chassis; it carries the brake cylinders and the elevating mechanism. The brake piston rods are attached to the forward part of the chassis and draw out in operating. The orifices which permit the liquid to pass from front to rear of the piston during the recoil, vary according to a certain law. A new arrangement enables them to be calculated mathematically so as to oppose a constant resistance throughout the duration of the recoil. The return into battery is performed automatically as slowly as may be desired.

A new elevating mechanism operated by a training shaft placed perpendicular to the flasks, acts upon a toothed sector attached to the gun without the aid of any endless screw. The manœuvres are consequently more rapidly and easily performed. The interposition of friction cones prevents the kick of the gun from being transmitted to the gearing.

Chassis.—The chassis is formed from flasks connected by transoms. It carries the mechanism for pointing in azimuth. This training is accomplished by means of an arrangement similar to that used in elevating, which causes a pinion to engage a horizontal toothed arc cut around the edge of the bed-plate.

The Bed-plate.—The bed-plate, which is fixed upon the deck of the

XUM

ship, carries the circle of live rollers. It contains the pivot around which the carriage turns. In the two types, central pivot and front pivot, it is cast in a single piece, in order that the installation may be made with greater accuracy, that the pressure may be more evenly distributed over the deck, and that any flexure of the deck will have no influence upon aiming. Withdrawing from battery is accomplished by means of tackles preferably with the assistance of hydraulic appliances. Certain of the front pivoting carriages have a screw arrangement which enables the entire system to be withdrawn into the interior of the ship. The gun being withdrawn from battery it can be lashed to the deck. This carriage can be provided with a shield of sheet steel which is fixed to the chassis.

In order to diminish the shock to the deck of the ship when these carriages have to be mounted on light decks, use is made of the horizontal chassis. The general arrangement of the carriage is preserved, but as gravity no longer operates to assist its return into battery, recourse is had to a recuperator provided with springs. (This recuperator is a cylinder in which the liquid escaping from the recoil cylinders is caused to press against a powerful spring, through the interposition of a piston head, this accumulating energy to return the carriage into battery.)

By closing all communication between the cylinders and the recuperator the carriage can be immovably fixed upon the chassis.

The carriage with circular chassis is employed in certain cases where it is necessary to use a relatively light carriage that will produce tensions and shocks as far reduced as possible. This result is obtained by so constructing as to make the resistance of the brake always act parallel to the force of recoil. The flasks of the carriage proper have the form of a large circular segment, whose chord serves as a slide for the brake cylinders. The brake piston rods are thus caused to abut against the circular slides of the flasks of the chassis. The return into battery is obtained by means of a recuperator. A special arrangement enables the carriage to be given any desirable inclination, to suit any angle of elevation. (One of these carriages has been purchased by the U. S. for trial with the 12-inch mortar.)

The principal advantages of the naval carriages of the Canet system are as follows:

1. Reduced dimensions, which enable the carriages to be light and strong without offering much surface to the fire of the enemy;

2. Reduced recoil and little obstruction to the deck;

3. Facility of manœuvre provided by the lightness of the carriage and by the good arrangement of the parts;

4. Accuracy under all angles of fire;

5. Special arrangement of the mechanism of the brake cylinders which permits the velocity of the return into battery to be regulated;

6. The protection given to the principal parts of the carriage.

Turret Carriages.—Armored turrets for guns of large calibre are mounted upon a movable platform which carries the overhead covering in the closed turrets but only a protecting shield in the barbette turrets. This platform, composed of a solid framework of sheet metal, turns around a pivot fixed upon the deck of the ship; it is supported by a ring of live rollers. Move-

ment is given either by means of hydraulic tackling or by hand by means of an endless screw worked by cranks engaging a circular toothed arc attached to the movable part of the turret. In the centre, movable with the platform and protected by a special armor, is the loading shaft through which is elevated the ammunition, either by a windlass or by a hydraulic lift, which according to the depth of the ship, can be either telescopic or with tackling.

The truck which carries the ammunition, being guided throughout its entire ascent, is placed in the desired position by a system of pulleys and of hydraulic tackling suitably placed. The projectile and the carriages having successively arrived in place, the loading ladle is carried to the face of the breech. The seating of the ammunition in the chamber is accomplished by means of a telescopic rammer operated either by water under pressure or by hand. The gun can be mounted upon the ordinary carriage in case the manœuvres have to be made by hand. The operations of elevating and traversing are performed by the usual mechanism.

Pieces of heavy calibre are ordinarily placed in a cradle and held by means of hoops around the body. The cradle carries the brake cylinders; it slides upon a chassis which rotates about a horizontal shaft to which are attached the brake piston rods. The elevation is given by means of a hydraulic press acting upon the chassis, which pivots around a horizontal axis placed in front. The cylinders with their valves for returning into battery are arranged in such a manner that they can be fixed immovably upon the chassis.

The manœuvring of the carriage upon the slides of the chassis is effected by means of hydraulic pressure. The barbette turrets are protected against the fire of projectiles by shields of plate metal.

Behind is the conning tower from which the aiming-chief can follow the movements of the gun, at the same time that he is able to overlook the entire horizon. He has close at hand the mechanism for operating the turret, the gun and the ammunition. In closed turrets the chief of the piece is able to aim only through the port-hole.

The advantages of these different arrangements, which are due to M. Canet, are the following:

1. Thanks to the central shaft the loading can be effected in every position without the necessity of bringing the gun back every time to a certain position. The ammunition can thus be sent up directly and continuously from the magazines in rear of the gun, while the aiming chief continues to follow the hostile ship. The manœuvring is consequently easier and more rapid. No other system of turrets has this arrangement, and M. Canet is the first who has made use of the central loading shaft.

2. The employment of the cradle, instead of the chassis with inclined slides, considerably diminishes the shock upon the deck.

3. The opening in the shield or in the overhead covering can be reduced to a minimum.

4. In the barbette turret, the axis of rotation of the chassis, which is a very important part, is placed completely under cover of the armor.

5. In these turrets the aiming-chief overlooks the entire horizon, and can follow very easily a moving object.

Landing mounts.—The navy makes use of material for landing. These carriages are provided with a hydraulic brake which is attached to the supporting pivot, which limits the recoil in the desired proportions. The carriage can be disembarked very easily and is then ready to enter the field. For landings of much importance, and on board small battle-ships, the gun is mounted on a central pivot carriage with rockers and hydraulic brake.

New Carriages.—We believe it necessary to insist upon certain important modifications introduced by M. Canet into his new types of carriages, which have been placed in service during the last few months. There remains now only the primitive model of hydraulic carriages, of which all the mechanism has been improved.

As to its general arrangement the new carriage forms a stronger and more compact combination; it is less cumbrous, lighter, easier to manœuvre, and better protected. It is so constructed as to resist the fire of heavier guns.

In the new brake, thanks to a special arrangement, the openings of the orifices for the flow of liquid can be varied in any manner whatever, and not according to a uniform law as in the English carriages. This variation follows step by step the velocity of recoil, and permits the brake to yield a constant resistance during the entire time that the carriage slides upon its chassis. There is thus obtained from the brake its maximum useful effect, and the sudden variations in its action which overstrain the metal are thus suppressed. The return into battery which is executed automatically is under complete control. In a heavy sea, consequently, the carriage can be fixed firmly to the chassis. Withdrawing from battery is either performed mechanically, or by means of a hydraulic arrangement situated in the carriage which requires only the assistance of tackling. The extent of recoil has been reduced in a notable degree. Manœuvring is easier and more rapid. The endless screw and helicoidal wheel for giving elevation have been suppressed and replaced by a special system of rollers and toothed wheels comprising only direct gearing, of which one is within and the other without. The system is reversible but not reciprocal. The suppression of part of the friction due to the endless screw renders the manœuvring much easier and more rapid than in the old carriages. The elevating shaft, which was placed parallel to the flasks of the chassis and was a cumbrous element, delicate and subject to deformation, has been suppressed. The central pivot carriage, instead of being mounted as in the former type, upon four rollers, rests upon the bed-plate through the intervention of a ring of live rollers. In the front pivot carriages the bed-plate in two parts has been replaced as we have already stated, by a bed-plate of a solid piece with a double traversing ring, which distributes the strains due to firing more uniformly over the deck, and renders the carriage less sensible to the inconveniences which result from the warping of the deck.

Disappearing Carriages.—In siege operations and for the defense of fortified places and the sea-coast, disappearing carriages are now in much favor, especially abroad. These carriages, which are able to support guns of large calibre, can be placed behind earthen parapets, or in masonry em-

XUM

placements, behind armor, or at the bottom of pits. Under the effort developed by the powder gas the gun descends and disappears behind the parapet or into the pit. It is thus completely sheltered during loading.

Armstrong, Moncrieff, Admiral Labrousse, M. le Commandant Bussière, have successively proposed types. M. Canet has produced a very successful form of disappearing carriage.

The gun is borne by a long double lever which pivots around trunnions fixed to a revolving platform. The lower end of the forked lever acts upon the piston of a hydraulic brake communicating with two lateral cylinders whose pistons are loaded with springs, and which act as accumulators. The gun remains parallel to itself as it falls to the rear, throughout its successive positions. The gun crew loads, points with the level behind the parapet or in the pit, and allows the gun to return to battery only when ready to fire, by opening the communication between the brake cylinder and the recuperators. At the instant the gun reaches its position in battery an electric cuircuit is completed and the charge is fired. Under the force of discharge the gun falls to the rear again. The smallest earthen parapet is sufficient to shelter a gun placed upon a carriage of this kind.

FIELD MATERIAL, CANET SYSTEM, MODEL OF 1887.

The field batteries are armed with guns of 75 millimetres, long or short. These two types of gun, which differ from each other only in dimensions and weight, respond to varied conditions of service which they may be called upon to fulfill. The calibre of 75 millimetres permits sufficiently destructive effects to be attained, at the same time preserving the necessary lightness.

Guns.—The Canet material is distinguished by its power, its accuracy of fire, and its long range. These qualities are due to the relatively great length of the bore, the form of the chamber, to the nature of the powder, and finally to the excellent design of the projectile. The elastic resistance of the guns permits the firing of very heavy charges and consequently the attainment of high initial velocities. This resistance is due in the first place to the quality of the steel employed, which is of the first quality, forged, tempered in oil, and annealed. The tempering is accomplished under excellent conditions, for the constituent parts of the gun are always of very regular figure. The jacket with its locking device, which is shrunk over the rear end of the tube, gives an equal resistance in both the longitudinal and transverse directions. This resistance is not found to the same degree either in the regulation French system or in the Krupp system. Rapidity and simplicity of manœuvre is secured by the employment of a fermature derived from the French fermature and perfected to the smallest details. Important modifications have been made upon the plastic obturator in order to avoid all hardness, and to the firing mechanism, to which has been added a safety device consisting of a very simple cut-off. Thanks to this arrangement it becomes impossible to fire until the breech is securely locked. The necessity for such a safety device, which neither the regulation French system nor the Krupp system possess, has been recognized in consequence of numerous accidents that have happened in recent

years. The pattern of the breech-block has been so modified as to simplify the parts, to render their repair more easy, and to prevent mud and sand from getting into the mechanism, particularly among the threads of the breech-screw.

Carriage.—The body of the carriage is formed of two flasks securely fastened together by steel transoms. The wheels are of steel with a bronze nave box. The lubrication of the axle-arm is rendered continuous. The whole carriage is distinguished by great lightness. Each piece is placed so as to work as advantageously as possible and yet permit the dimensions to be reduced to a minimum. The recoil is much reduced, thanks to the funicular Lemoine brake, used in the French service. (This is the same Lemoine brake which has been adopted by the Omnibus Company of Paris, and has always worked perfectly.) This brake acts upon the felly; it is absolutely automatic, and unlocks as soon as the piece is run into battery. Elevations can be given with great accuracy. Although preserving the same stability, the distance between the wheels has been reduced. These guns can therefore be drawn over narrower roads than are required for the guns actually in use in France and Germany.

Ammunition.—The field guns fire four kinds of projectiles of about 11.46 pounds each; ordinary shell, ball-shrapnel, case-shrapnel, and ordinary case. The ordinary shell, filled with a very strong powder, are provided with a percussion fuse, while both kinds of shrapnel are provided with combination fuses. The cartridges are enclosed in a bag of raw silk. The flatness of the trajectory makes it easier to regulate the time of burst with the ball and case, shrapnel.

Limbers and caissons.—Each one of the pieces is accompanied by a limber which carries a portion of the supply of projectiles and cartridges. The remainder are placed in the caissons. The chests, which are divided into compartments, are of steel and wood. It has been the object of special study to render them shot and water proof.

Tools, accessories and spare parts, are carried in caissons and special carriages. This transportating material is very strong and very light. It can be made to travel narrow roads and can turn around in a circle of small radius.

MOUNTAIN MATERIAL, CANET SYSTEM, MODEL 1887.

This material is specially adapted for operations in countries of difficult access, where transportation can be effected only on the backs of animals. The mountain batteries are armed with guns of 75 millimetres, 99 kilogrammes (218 pounds) weight. The calibre allows a sufficiently destructive effect to be attained without any sacrifice of lightness. The gun is made from a single block of steel; the seat of the breech-block, the trunnion ring and its support alone are attached to it.

The body of the carriage is formed from two flasks cut out of sheet steel of special quality, which are firmly attached to each other by steel transoms. The recoil is greatly reduced by the employment of a screw brake that acts upon the felly, and can be locked and unlocked at will. The elevation which runs from 20° elevation to 20° depression, can be given with great accuracy.

The mountain guns fire four kinds of projectiles of about 4.6 kilogrammes

(10.14 pounds) weight; common shell, ball and case shrapnel, and ordinary case. The common shell are provided with percussion fuses, and the shrapnel with combination fuses. The cartridge bags are of raw silk.

Each carriage is provided with a pair of shafts, by which it can be drawn when the nature of the road permits. The ammunition is enclosed in special cases made of wood and steel, and separated inside into compartments, the imperviousness of which has been made the object of special care. Similar cases serve for the transportation of tools and accessories.

The material is very light and very solid. Each one of the constituent elements of the battery can be taken apart and carried on the back of a mule. The load on the pack-saddle for each animal does not exceed 220 pounds.

Let us compare this gun, so well adapted to the service that is demanded of it, with the 2.5-inch jointed gun of the English type that our neighbors across the channel think so much of, and which their factories seek to introduce among those nations that are obtaining their supplies of artillery from them. The jointed gun is an engine much too complicated for the arming of countries in which the artillery personnel is not constantly drilled in its manœuvre. This gun, which has already been in existence more than twenty years, has not grown into extended use, notwithstanding its power, which, at first sight appears to be great enough, because in practice it has yielded far less useful service than was at first expected. The mounting of it is not always as simple as would be supposed; in any case, the assembling of the two parts, body and chase, must be done with the greatest care, in order that neither escape of gas or erosion may be feared.

The English jointed gun of 2.5-inch calibre loads at the muzzle; it thus suppresses at once all the recognized advantages of breech-loading with regard to ease, rapidity, and accuracy of fire. For a mountain battery, in which the ammunition must be expended with the greatest care, breech-loading is absolutely necessary.

In a battery of jointed guns they reckon two mules for the gun and three for the carriage, or five in all. In ordinary mountain batteries only three mules per gun are required; one for the gun itself, one for the carriage, and one for the wheels and shafts. The number of animals is then reduced as far as possible. This point is one of very great importance. By taking five mules there are two chances more of having animals disabled by accidents or by attack in a defile. Now as each one of them carries one of the elements of the gun or the carriage, if it falls by the way for any reason, it is impossible to mount one of the pieces.

It is important then to divide the elements of the gun and carriage among as small a number of pack animals as possible. With the jointed gun the number of mules is 112. It is 76 only with ordinary batteries.

Another inconvenience is the increasing the time necessary for setting up and installing a battery. But the chief objection that can be made to the jointed gun is that it fires a projectile that is too light and inoffensive. There is nothing astonishing in the fact that a gun as long as the English 2.5-inch, which fires such a heavy charge and such a light projectile should give an initial velocity of 1440 f. s.

Likewise it is evident that the range of this gun must be greater under

XUM

the same angles than with the gun of 75 mm., which has an initial velocity of only 300 metres (984.3 feet); but it is to be noticed that beyond 4000 metres (4374 yards), especially in a mountainous country, errors in the estimation of distance become so great as to render it of little importance to have at one's disposal a gun that is capable of attaining long ranges. Furthermore a light projectile does not sustain itself so steadily during flight as a relatively heavy one.

Finally, a shell of 7.28 pounds is not able to produce the same destructive effects as that of 10.14 pounds fired from the solid gun of 75 mm.

When the 10.14-pound projectile strikes against a wall or resisting obstacle, the bursting charge being greater, the destructive power is much greater. These same projectiles have been specially studied with a view to giving the greatest possible number of fragments when they burst in front of a mass of the enemy. They contain more than twice the number of balls contained in the English projectiles of 7.28 pounds. In this point especially the gun of 75 millimetres is an improvement on the 2.5-inch, for in field and mountain pieces the real efficiency is in the destructive effect of the shell, as soon as range and accuracy of fire are assured by a sufficient initial velocity and a good construction for the projectile.

In termination we will give a few figures taken from the reports of firing from January to May, 1887, with the Canet 75 mm. guns.

The mountain gun throws a projectile of 4.6 kg. (10.14 pounds) with a velocity of 300 metres (984.27 feet). It weighs only 99 kg. (218 pounds).

The short field gun impresses upon the same projectile a velocity of 410 metres (1345.2 feet). It weighs 260 kg. (572 pounds).

The long field gun weighing 350 kg. (770 pounds) throws shells of 5.2 kg. (11.44 pounds) with a velocity of 550 metres (1804.4 feet).

The regulation French guns and the Krupp guns give nothing like this. This review of the material and of the results obtained show that in France they can not only manufacture but design guns complete in all respects. By the side of the very popular name of Colonel de Bange we can now place that of M. Canet. This sketch has for its object only to make known a system that men of the profession appreciate already at its true value. It will show that *the de Bange gun* cannot be taken as syonymous with *the French gun*. It will show in particular that our efforts have been crowned with success. We would not be astonished, considering the tendency which becomes more marked every day of ordering from France, to see within a few years hence, certain foreign countries completely abandon Krupp and Armstrong and adopt, as Greece, Japan, and others have already done, the Canet system.

RAPID FIRING GUNS.

For several years ships of war have been actively arming themselves with rapid-firing guns. Their power of penetration and the destructiveness of their shells is such that by directing upon the enemy a well-aimed fire with projectiles of reduced calibre his tops can be rendered untenable, if the one condition of sufficient rapidity of fire is fulfilled.

The efficiency of rapid-firing guns is especially manifest against a moving object, against swift cruisers, or torpedo boats that must be stopped at

any cost. These guns are placed in the tops, upon the bridges, or behind specially constructed shields. The trials made up to the present time in every country have been perfectly conclusive. Everywhere they are seeking a light gun, giving relatively high power, which can be loaded and aimed with great rapidity.

In the smaller calibres machine-guns are used: the Hotchkiss revolving cannon (regulation in France), Nordenfeldt machine-gun with 3 and 5 barrels, the Gatling gun, and the Maxim gun.

In the calibres of 37, 47, and 57 millimetres, Hotchkiss and Nordenfeldt have constructed rapid-firing guns whose efficiency and excellence of operation is an accomplished fact. But under the tendency, which is daily becoming more pronounced, of increasing the rapidity of fire, they have sought to pass the limit of 57 millimetres. Armstrong, Krupp, Nordenfeldt, Canet, and the French Naval Artillery, have built guns of 65 and 75 millimeters, and even of 10 and 12 centimetres.

Every day new progress can be perceived. Nevertheless it appears unlikely to us that they will pass the limit of 12 centimetres, because the loaded cartridge will be too heavy to handle.

To make the study of rapid-firing guns more complete in a ballistic aspect, we will give a brief summary of the extremely ingenious arrangements whose combination enables the loading and firing to be performed with such great rapidity. M. Nordenfeldt has adopted an almost uniform type of fermature for his guns, of which we shall give a brief description.

In rear of the bore is a kind of mortise. By the aid of a lever placed on the right side of the gun, the fermature, consisting of two principal parts, is operated. These are the breech-block, against which the base of the cartridge-case is supported, and the wedge which enters between the lock and the rear face of the mortise and serves to hold up the block during fire.

When the lever is pulled to the rear the wedge descends, then pivots around the axis of the lever, drawing forth the breech-block and exposing the opening of the bore. The empty case is withdrawn and replaced by another, and when the lever handle is again pressed to the front, the wedge ascends and again supports the breech-block. During these operations the extraction of the empty case has been performed automatically, the hammer is cocked, and the gun is made ready to fire. A safety device prevents the falling of the hammer before the breech is securely locked.

M. Canet has retained the interrupted screw block in use in all French guns, in order to diminish the length of the piece in rear, and to avoid the difficulty of manœuvre which is inseparable from the use of the heavy breech-blocks required for heavy calibres.

He has employed a very ingenious arrangement. The segmental screw is a truncated cone. The breech is opened by the single movement from right to left of a horizontal lever. During the first part of the motion the lever causes the breech-block to turn by means of toothed wheels. When the threaded sectors have ceased to engage, the lever, continuing to move to the left, withdraws the block from its seat. By pushing the lever still farther to the left the console which carries the block is made to swing to one side on its hinge and the opening of the chamber is exposed.

An extractor withdraws the empty case. When the breech is closed again the hammer is cocked. A safety device prevents it from falling before the breech is completely closed.

The rapidity of fire of guns of 65 or 75 millimetres is about 15 to 20 shots per minute.

TORPEDO GUNS, CANET SYSTEM.

This arrangement, constructed after the plans of M. Canet, permits a torpedo to be launched at any instant as a projectile, thus suppressing the costly and cumbrous installment rendered necessary by the employment of compressed air.

The gun is composed of a tube of bronze or steel, with a groove to guide the projectile, a starting tap acting upon the driving mechanism, and a retaining bolt to hinder the torpedo from sliding out of the tube under the influence of the movements of the ship. The breech mechanism is a screw block with interrupted threads analogous to that of the guns of the regulation French system. It opens and closes by means of a crank acting through a pinion upon a rack cut in the block. Manœuvring is consequently easy even when the bearings are too tight.

When the block is withdrawn it is fastened to the tray by means of a locking stud which is automatically released on closing. The launching cartridge is made of a special powder; it has a peculiar form and is placed in a chamber cut on the interior of the breech and arranged in such a manner that the gas must strike the interior of the walls of the tube before reaching the projectile, so as not to injure its rear mechanism. The development of the gas takes place progressively and the pressure does not attain a high figure. The charge is ignited by means of an obturating percussion primer that is removed by means of a hand extractor. Firing is accomplished by means of a hammer shaft upon which a trigger acts; the arrangement is such that the trigger will not operate unless the breech is tightly closed. The accidents due to incomplete closing are thus avoided.

The firing trigger is operated by a strong spring under tension which may be released by an electro-magnet. A closed circuit permits the battery chief to discharge the system from any point whatever of a ship or from a watch tower on shore. The motion which frees the firing bolt releases the retaining bolt that holds the projectile in the tube, thus setting it free. A lever placed so as to be operated by hand permits the release of the launching spring if the man who aims can see the direction in which to fire for himself; and if in case on account of any accident whatever the battery will not work, he is warned by the ringing of an electric bell attached to an independent wire. If the main-spring breaks, ignition is effected by the manœuvring lever which serves to place this spring under tension. If all the mechanism is out of order the hammer can be placed on the primer and struck with a heavy piece of lead to produce ignition.

Advantages of this system of launching.—They are as follows:

It is ready to operate at any instant. It permits the torpedo to be launched with certainty when the launching and igniting mechanism is entirely destroyed. It prevents ignition if the breech is not entirely closed. It prevents the gas from injuring the rear part of the projectile, and by the

manner in which it develops the pressure it permits the employment of heavy charges, which allow the torpedo to be fired when there is water in the bore, as on board of torpedo boats. The operation of the breech mechanism and the various parts is extremely easy. The obturation is excellent. The system presents all the advantages of electric ignition; instantaneous fire with the possibility of discharge from a distant station, at the same time preserving that of ignition by a percussion primer which is more certain and gives no miss fires.

Carriages, Manœuvring Parts.—The torpedo gun is either fixed, as in torpedo boats and in the bows of certain vessels, or moveable, as on cruisers and ships of the line. According to the position that it is desired to give the portable tube, and the emplacement provided, it is placed upon the decks, or installed between them. It is completely within the hull of the ship, or rather it does not project beyond the walls.

The portable gun is supported by a roller truck which is placed upon the deck or upon a circular guide arranged overhead. The muzzle is attached to the wall of the ship either by an adjustable spherical joint which is made perfectly tight, or by means of a copper joint. When the muzzle in the firing position projects beyond the wall, it may be drawn back and is carried by an overhead track suitably arranged to permit the easy loading of a new torpedo. It can be brought back easily to its moorings by the use of the bars by which it is drawn into the interior of the ship.

Advantages of this kind of Carriage.—The study of this type of carriage has been made with a view to obtaining the following advantages:

Easy, rapid, and accurate manœuvre of the gun. Thanks to the employment of the spherical joint, we obtain a diminution of the opening cut in the wall of the ship, at the same time allowing large lateral angles of fire: A system of closing the port-hole that is rapid, as well as perfectly water tight, which is extended to the joint of attachment of the tube to the wall: A minimum degree of encumbrance, both in the fighting position as well as at the moorings: Ease of withdrawing the gun into the interior of the ship, thus closing the port-hole to the fire of the enemy and permitting the firing to be effected in safety.

Defense of Channels.—These torpedo guns being mounted upon essentially portable carriages can be effectively employed in the defense of channels and rivers. The launching being accomplished by powder, the gun is ready at any time to be transported by land or by boat to a threatened point. It is thus possible to avoid in certain cases the use of expensive and often dangerous lines of submerged torpedoes.

The simplicity and the easy operation of this engine permits it to be used in hastily arming steam or oared boats so as to materially add to the effects of a night attack.

XUM

Military Notes.

ARTILLERY REORGANIZATION IN ENGLAND.

CORRESPONDENTS have recently drawn attention in our columns to the slow progress which is being made with the so-called reorganization of the Royal Regiment of Artillery. Beyond the abolition of the "right of fall," and the grant of increased pay for the officers of the Garrison Artillery, little change, according to the view of our correspondents, is observable. Promotion still goes on one list; and officers are transferred from the mounted to the dismounted branch of the regiment, and *vice versa*, very much as before. This is true enough, but we doubt whether it would be either possible or expedient to accelerate the progress of changes which we have always urged should be gradually and carefully introduced. It must be remembered that the tendency of military organization is to preserve rather than to reform. Changes of system clash with individual interests, and cause so much personal inconvenience to all concerned, that those placed in power are naturally inclined to let well alone —*quieta non movere*. Unless there is some strong call for reform, arising, for instance, from failure on active service, it is very difficult to bring about any radical change of system, even when its theoretical necessity has been made perfectly clear. This does not imply any want of energy on the part of the authorities, but merely a well-conceived desire to respect existing institutions and avoid harassing individual interests.

Lord Wolseley stated before Lord Harris's committee that the existing organization of the regiment was the "greatest absurdity" he "could possibly imagine." Yet he was compelled in spite of all his efforts to allow this "absurdity" to continue during all the time he was in office. Sir Redvers Buller has expressed equally strong opinions on the same subject, but finds himself powerless to destroy a great centralized organization—such as the Royal Regiment of Artillery is—which with all its theoretical anomalies has not been found wanting when judged by its past history. We are entirely disposed to agree with the views of His Royal Highness the Duke of Cambridge, when he argued that what is wanted is not reorganization, but readministration.

Six years have now passed away since we opened our columns to the discussion of Artillery organization. That discussion undoubtedly led to useful results. The appointment of Lord Harris's committee enabled the whole subject to be thoroughly inquired into. While the committee submitted a divided report in regard to the expediency of reorganization, all the members composing it were agreed that certain definite steps should

XUM

be taken to improve the condition of the Garrison Artillery. The recommendations of the committee on this point have been adopted. Owing to the abolition of the "right of fall" it is now possible for the Adjutant-General, on the advice of the Deputy-Adjutant-General, R.A., to post officers on promotion, or at any other time, where they can be most usefully employed, and not where chance may have placed them irrespective of whether or not they were fitted for the duties which they were called on to perform. The increased pay given to officers while serving in the Garrison Artillery has done a great deal to compensate them for finding themselves for a period doing duty in the dismounted branch of their regiment. The inducements are now sufficient to justify the belief that there will gradually grow up a body of officers who of their voluntary accord will choose to make their career in the Garrison Artillery. Further radical changes, *such as the separation of officers into two lists, and the complete severance of the Garrison Artillery from the horse and field batteries, are neither desirable nor any longer wished for.* The Garrison Artillery of to-day is not what it was in 1887, a neglected corps, despised by its own officers, and starved by the authorities; but under the improved administration of Sir Redvers Buller and Generals Markham and Williams, it is fast regaining the prestige which it enjoyed in the early days after the Crimean War. We think there are distinct advantages in recruiting its ranks from time to time by officers from the mounted branch. Some of the best work recently done in our maritime fortresses and coaling stations has been due to officers who have temporarily joined the Garrison Artillery from horse and field batteries, and who have brought to bear on their duties the experience gained while serving in the field. We think also that there are great advantages in training all artillery subaltern officers in mounted batteries.

The field battery is an admirable school for young officers, and we should be sorry to see Garrison Artillery lieutenants deprived of the opportunity which service in a field battery gives them of learning to be soldiers. The Artillery authorities are now engaged in organizing local establishments of Garrison artillerymen for each of our great fortresses at home and abroad. The officers of these local establishments will have charge of all matériel, and the necessary number of specialists will be included in the ranks of these newly formed cadres. The tentative appointment of armament officers has had good results. When the armament was placed in charge of the officers of the mobile units of Garrison Artillery it suffered from the constant changes of officers who were charged with its custody, preservation and improvement. Continuity is now secured by means of the local armament majors. We are disposed to think that in large fortresses the lieutenant-colonels commanding sections should have full responsibility for the matériel—the armament majors acting as their staff officers in this matter. In small districts where there are no lieutenant-colonels the armament major should take the place of the lieutenant-colonel. This and kindred questions, however, are subjects for administration within the existing organization. We cannot do better than conclude this article by quoting the words of Lieutenant-General W. H. Goodenough, C.B., R.A,

who, when he held the office of Inspector-General, Royal Artillery, wrote as follows: "There is work to be done to bring our garrison and coast service to the required standard of efficiency, in instruction of personnel and provision of matériel. I believe in the progress to be expected from pursuing and developing a system long followed, though never fairly grasped, *and I deprecate reorganization with its specious attractions absorbing energy in alterations which may or may not lead us to the desired end.*"—*The Army and Navy Gazette.*

THE ARMY MEDICAL STAFF.

The English service, from which many of our customs are derived, has still many points of resemblance to our own, and none more striking, perhaps, than the present agitation among our medical officers for combatant titles and a more strictly military status—an agitation confined almost exclusively to England and the United States.

The two following letters from English army-surgeons are inserted as illustrating the question at issue in the British army.

To the Editor of the "Army and Navy Gazette," London.

SIR:—There has been a great deal written lately in the various papers about the Army Medical Staff, but most of the letters appear to have been written by those officers of the Department who are anxious to take upon themselves the duties of combatant officers in addition to their legitimate profession. There are a few officers in the Medical Department, and I am one of the number, who find that the proper care of the sick and attention to sanitary duties is quite enough without having the many onerous duties of combatant officers to perform in addition. No man can efficiently perform the duties of two professions at the same time; he may get through them after a fashion, but an indifferent fashion. *I am quite certain that we are every year retrograding in our efficiency as medical men in proportion as we take more upon ourselves the duties of combatant officers.* Men will naturally devote most attention to those branches of their profession which will get them forward in their walk in life, and to be a good physician or surgeon in the army is little use in this way, but to understand infantry drill, military law, pay-sheets, clothing accounts, is a much more paying thing. I humbly say, let us stick to our own profession, for the performance of which we have our existence in the army. When I see a surgeon-major, an officer drawing between £500 and £600 per annum (pay and allowances), instructing a squad of men in elementary drill, teaching them by numbers, the sort of work that in a regiment would be performed by a lance-sergeant or a corporal, I say he might be better employed at something else, and the drill would be very much better taught by a non-commissioned officer. At the many inspections of hospitals by principal medical officers at which I have been present, I have been struck how very rarely any question is asked about the medical or surgical treatment of the patients, the great desire appears to be to get away to see the hospital orderlies drilled and inspect their kits, etc., etc. In the next war in which we are engaged, if there is a breakdown of the Medical Department it will be owing to our taking too

much on our shoulders. I think there would be very much less social friction between the combatant and medical officers if the latter would only be content to stick to their own profession. I know that a large number of army surgeons differ in opinion from me, but I think it right that the ideas of the minority should be known. ARMY DOCTOR.

SIR:—The letter in your last week's issue on the above subject, signed "Army Doctor," strikes the keynote. If Army doctors would only realize that by the present position which they are taking up they are losing all the advantages of the past, I think they would pause in their movement. The one end and aim of their existence is, or ought to be, the welfare of their patients. It matters not what amount of gold lace they wear or what titles they possess or require, their *raison d'être* is strictly medical. If the combatant officers in the service imagined for one moment that by granting the medical staff titles similar to their own the patients committed to the care of the medical officers would be cared for more and attended to better than they are, I am perfectly certain these titles would be granted at once. There is unfortunately, however, a growing feeling in the service that the officers of the medical staff do not consider their medical duties in the same light in which their civilian brothers do theirs. *There is also a growing tendency on the part of those garrisoned in various military centres to call in when ill civilian practitioners.* This may be absurd, but it is nevertheless a fact. The truth is, the medical officer of the present day is falling between two stools—combatant duties and medical—and it is impossible for him to avoid coming to the ground. He cannot take sufficient interest in his cases, as he may be here to-day, there to-morrow; and a greater part of his time is taken up by work which has nothing whatever to do with his duty of healing the sick. The higher in the service he gets the less he has to do with medical matters, and therefore instead of being available for "consultation" by his junior brethren he is performing purely administrative duties for which his medical education and valued medical experience is of no help, indeed, is absolutely useless. One comes across men constantly, young in years, who before and after retirement have forgotten all their previous medical knowledge at an age when if they had been civilian doctors their former experience would have been simply invaluable in hospital or consulting practice. They have been doing no medical work for years, and in medicine the "student ought never to sleep." For this the doctors are not to blame; it is the fault of the system which makes men, after special study in a particular line and after much experience in their duties, take up other work for which their earlier training was never intended to fit them. I have heard it said—the medical knowledge of the Army doctors is in inverse proportion to the amount of gold lace they wear. The profession of medicine is a noble one—the preservation of life far superior to the destruction of it—and the highest skill which is shown by the men who obtain their commissions in the medical staff ought never to be permitted to be wasted on duties outside their profession. Every opportunity ought to be given to the medical officers to keep up their medical knowledge to the highest point of excellence, and no cheese-paring economy shown in the equipment of station and other hospitals. The old regimental system might well be restored, now that the

XUM

education of medical men has advanced so rapidly. There were disadvantages in the system in the old days which could not exist now. The title "Dr." may perhaps only legally be applicable to those holding university degrees, but in spite of this the medical officer will be "doctored" to the end of his days, whether he be a brigade-surgeon-lieutenant-colonel or a young surgeon-lieutenant. The term doctor is not one of reproach—it is not so in civilian life, and it ought not to be looked upon as such by medical officers any more than the title "Padre," by which our chaplains are known, is felt as an insult by them. The Army chaplains have, luckily for themselves, only their professional duties to attend to, and no branch of the service is so honored by the affection and esteem of all ranks as the "Bishops Brigade." I am not denying the good work done by the Army Medical Staff, both in peace and in war—that goes without saying; but I wish to point out that the medical officer who will retain the affection of the combatant officers, and who will be honoring his own profession, is the one who will show by his daily life that the care of the sick is his first consideration—that he is a *medical* officer first a "*soldier* officer" afterwards.

B. G. A.

September 2, 1893.

PATENT SPECIFICATION OF A NEW AUTOMATIC RIFLE.

April 8, 1892. Firearms.—F. Mannlicher. Relates to automatic guns. *Breech Action.*—The barrel and breech-bolt recoil together compressing springs. They are locked together during recoil by a hinged locking bar, the rear end of which enters a recess in the breech-bolt. At the end of the recoil a part of the locking bar enters a recess of the standing breech and thereby disconnects the breech-bolt from the barrel, which then remains at rest in its recoiled position, a projection on the locking bar taking against the rear of a rib whilst the breech-bolt continues to retire, thereby further compressing the spring and opening the breech. During this opening movement the empty cartridge is extracted, and the return of the breech-bolt under the action of another spring drives a fresh cartridge into the barrel and raises the rear end of the locking bar, thereby locking the barrel and breech-bolt together, and causing them both to advance to the forward position. The gun is cocked during recoil by an arm of the pivoted cocking lever pressing on the surface of the standing breech, thereby withdrawing the firing pin, the sear holding the cocking lever in the cocked position. A safety lever for preventing accidental discharge is described.

THE WATKIN POSITION FINDER.

To the Editor of the "Army and Navy Gazette."

SIR:—"A Field Officer, R. A. (Garrison)," in your last issue, endeavors to fix the responsibility for some statement in *Truth* on me. I have not the advantage of knowing exactly what he alludes to, and I should not reply were it not that he further states that I am opposed to range finders, position finders, depression range finders, and to all the works of Col. Watkin, a statement which gives an entirely false conception of my views, and which might prove misleading to many. Over 30 years ago I was one of the first to

recognize how greatly the effect of our improved artillery, then in its infancy, would be increased by the possession of simple and easy means of knowing the range of objects at which fire was directed, and I have ever since urged all people with a turn for invention whom I have come across to step into the gap and supply that want. A great many field range finders, and some few position finders and range finders of various sorts for coast artillery work, have since been produced. I think I have seen most and tried many in their turn, especially the field range finders. I regret that none have come up to my ideal of a perfect service instrument. My ideal may be too high, but it is well within the limits of practical realization. It is true that I have frequently opposed the introduction of instruments, many of which are exceedingly ingenious and elaborate, but which I knew to be faulty in general principle. I have already seen them drop one by one out of use. As regards Col. Watkin's inventions and adaptations, I am as great an admirer of their mechanical correctness, ingenuity and beauty of finish as any one; but I venture to think that his genius invariably runs to unnecessary complication and delicacy, generally entailing slow work and the necessity for a large and highly trained staff. His depression range finder, being of comparatively simple construction, is a most popular and valued instrument with garrison gunners. Properly found with small additions it would probably answer all purposes, where a sufficient height is available, at moderate ranges. The constant cry is for more of them. They are often expected to do as much as several position finders. What I have perhaps urged in "season and out of season" is that where an instrument is introduced as an aid to fighting, its value is best ascertained, and economy to the State ensured, by placing it in the hands of the fighting men themselves, and not in those of the inventor. They, and not the inventor, can best decide where it should be placed and the best method of using it for their purposes. Such a course aids an inventor, enabling him to adapt his instrument, by further additions and improvements, to the requirements of war. The bootmaker is not as competent to decide where and to what extent a shoe pinches as the wearer though he may best understand the exact alterations required.

J. B. RICHARDSON.*

School of Gunnery, Shoeburyness, Sept. 4, 1893.

To the Editor of the "Army and Navy Gazette."

SIR:—A little over four years ago, being then quartered at Fort Bovisand, Plymouth, I was taken into a dark cell and initiated into the mysteries of "the long arm and the short arm." I found I was being introduced to an instrument, the principle of which was childishly simple. I say this because I had myself thought of it eight years previously. Having been ordered to perfect myself in the working of the instrument, I for many days practised laying it on any collier, cargo-boat, or tug, leisurely entering or leaving the harbor. I soon found that it was all a chance whether the issue of each working was successful or abortive; and the abortions seemed to predominate. Here was a problem: Why an instrument which every one

*Colonel Richardson is colonel commandant of the School of Gunnery, Shoeburyness.

said was theoretically and mechanically perfect yet produced so many abortions? I discovered that like results ensued whoever was in charge, and, considering that I might therefore disregard the personal error, I was reduced to a scrutiny of the conditions of the theory, and the terms of the examples. The theory is that "given the course and speed of a ship you can predict its position at a given moment." I discovered, however, that there is a postulate here sub-understood, a postulate which neither inventor nor worshippers care to dwell on, which postulate is—"course means straight course." I now obtained a chart of the eastern entrance to Plymouth Harbor, traced out the deep-water channel, and found that the channel is tortuous! So I saw why it was that my prediction was so long in coming, and so often wrong, and, in fact, never correct, unless I used a very thick pencil point. That reminds me that one day some torpedo boats came in at full speed. It was a great opportunity, but, as I had just broken the point of my pencil, I lost it. As a result of my experiences, now that the position-finder is at last being openly discussed, I offer for criticism two guiding rules, one regarding installation, and the other regarding practice. But I must presume—1st, that against a stationary or slowly-moving target the position-finder is a mere embarrassment of unnecessary costliness; and 2d, that an enemy who of course knows the position-finder and when to expect it, will, even when he can take a straight course, prefer a tortuous one. The rule as to installation is this: "Ascertain what chance there will be of an enemy bent on rushing past you being *obliged* to take a straight course." (This should be done before installation.) The rule as to practice is, more especially when the enemy is making a straight quick rush past you, "Use the depression range-finder and straight-edged sight, and keep laid as long as you can (for hitches on the gun floor are liable to arise, but if you are laid you can fire up to the last moment instead of losing your shot by waiting for a prediction)."

R. E. MOSTYN, Capt. R. A.

Crownhill Fort, September 11, 1893.

PRESERVING TOOLS FROM RUST.

A good plan of preserving tools from rusting is the simple preparation employed by Professor Olmstead of Yale College, for the preservation of scientific apparatus, and which he long ago published for the general good, declining to have it patented. It is made by the slow melting together of six or eight parts of lard to one of resin, stirring till cool. This remains semi-fluid, ready for use, the resin preventing rancidity and supplying an air-tight film. Rubbed on a bright surface ever so thinly it protects and preserves the polish effectually, and it can be wiped off nearly clean, if ever desired, as from a knife blade; or it may be thinned with coal oil or benzine.—*From the Royal Engineers Journal.*

GUNS AND PROJECTILES.

1. In France the introduction of a new field gun of 7.4 cm. cal. has been taken up which—being a rapid firing gun of 10 or 12 shots per minute—is to be provided with a projectile weighing 5 or 6 kg., and with shields for

the protection of the men. (*Swiss Journal for Artillery and Engineers*, 1892, No. 9, p. 313.)

2. In the shops of Bofors, Sweden, two siege guns have been tried of 12 cm., a fortress gun of 15.5 cm. and a naval gun of 15.24 cm. cal. of unwrought cast steel. The limits of elasticity of samples from the base was 34 kg., of breaking 68 kg. Comparisons with other guns of various states showed, in part, the superiority of the Bofors gun, partly approximate equality. Sweden will no doubt adopt this unwrought steel as gun metal. (*Riv. di Art. e Gen.*, Sept. 1893, p. 527.)

3. In France a new gun has been tested, cannon Canet, cal. 10 cm. (3.94 in.) 180 cal. long, charge 6.4 kg. smokeless powder, which gave an initial velocity of 1026 m. (3365 ft.) to a projectile of 13 kg. (28.6 lbs.) (*Riv. di Art. e Gen.*) C. R.

ALUMINUM.

La France Militaire, No. 2472. gives interesting details of experiments which have been conducted in the Laboratory of the Intendance Committee in Paris with the object of determining the suitability of aluminum vessels for containing liquids, articles of food, etc. Pure aluminum seems to be hardly affected by even sour liquids, but the presence of the small quantity of iron which is nearly always present in the best commercial aluminum seems to favor chemical action and produce slight discoloration of some liquids. Wine, beer, cider, and other liquids were left for months in contact with the metal, and were not injuriously affected, and although the metal was slightly eaten away in most cases, the conclusion was arrived at that aluminum vessels could be used with safety for drinking bottles and culinary articles. Soup and cooked meat can be left in such vessels for 24 hours without any apparent effect, and in any case less effect was produced on aluminum by the various liquids experimented with than on the metals in ordinary use, such as iron, copper, zinc, and tin, lengthened exposure to the atmosphere appears to produce no effect, so that in this respect there is thought to be no obstacle to the extensive use of this metal for an endless variety of military purposes.

New patterns of field water-bottles and drinking cups of aluminum have been approved in Germany.

It is expected that the weight carried by the German infantry soldier will shortly be considerably reduced, owing to the extensive employment of aluminum. At present this weight is 31 kilos. 253 gm. (=68.59 lbs.) inclusive of the spade, tent, certain articles of copper, etc. If the projected alterations are carried out, the weight on half the men will be reduced to 25 kilos. 451 gm. (=55.55 lbs.) and that on the other half (those who carry the spade) to 26 kilos. 281 gm. (=57.6 lbs.)

Experiments are being made in Bavaria with drums, the body and mountings of which are made entirely of aluminum. In ordinary side-drums the diminution in weight is said to exceed 2¼ lbs. (*Journal R. U. S. I.*)

The *Revue de L'Armée Belge* states that the attempt to manufacture cartridge shells of aluminum has proved a failure owing to the fact that the metal is too soft and loses its tenacity as the temperature is raised; the base-cup of the shell breaks away and the cylinder is entirely crushed.

PEACE EFFECTIVE OF THE GERMAN ARMY UNDER NEW LAW.

Numbers under the law of July, 1890.			Increase under the new law.		Present peace effective.	
Number of men incorporated annually.....	175,000		54,000		229,000	
PEACE EFFECTIVE.						
Officers	20,662		1,793		22,455*	
Under-officers.....	66,952	486,983	10,912	70,110	77,864†	557,093
Men	420,031		59,198		479,229	
1-year volunteers.....	9,000				9,000	
Medical officers	1,840		228		2,068	
Veterinary surgeons....	558		20		578	
Paymasters.	895		207		1,102	
Armorers and saddlers..	947		206		1,153	
Total.....	520,885		72,564		593,449	
Troop horses.....	93,750		3,094		96,844‡	
NUMBER OF UNITS.						
Infantry battalions.....	538				538	
Half 4th battalions (2 companies)			173		173	
Squadrons	465				465	
Field batteries..	434		60		494	
Foot artillery battalions.	31		6		37	
Pioneer battalions.....	20		3		23	
Railway battalions.....	5		2		7	
Train battalions.....	21 less 1 company		1 comp'y		21	

*Exclusive of gendarmerie, officials of intendance, military justice, administrative services, etc.

†Exclusive of gendarmerie, subordinates in administrative services, military justice, etc.

‡Exclusive of about 18,000 officers' horses, 1900 horses of 1-year volunteers, and "Krümpers" (cast horses retained for regimental purposes and not provided for in the Budget).

—*Rev. Mil. de l'Étranger.*

A COLLAPSIBLE BOAT FOR CAVALRY.

According to the *Revue du Cercle Militaire*, a collapsible boat has been adopted for German cavalry which is sufficiently strong to admit of the formation of a bridge by which artillery can be passed over rivers. It is said that each regiment is to receive two of these boats, each carried complete on a four-horse wagon, and that the 12 boats thus provided for a cavalry division will enable it to throw a bridge about 52 yards long in a very short time. This bridge train of a division takes up the space of a battery, and so adds considerably to the length of a column of march, but the experiments which it is said have been already made on a large scale show that this inconvenience is more than compensated by the numerous and important services which the boats are capable of rendering. With the object of improving the instruction of the cavalry in the execution of field works, a certain number of instructors from the pioneer battalions will in future be attached to the School of Equitation at Hanover and to the regiments of cavalry.—*Journal R. U. S. I.*

XUM

FEEDING OF HORSES.

The *Neu Mil. Blatter* gives the following account of experiments recently carried out in France, and subsequently in Denmark by Veterinary Surgeon Marlot, with the object of deciding whether horses should be fed before or after watering. As an animal is nourished not by what it merely eats, but by the food it digests, the first object of the experiments was to establish the effect on the process of digestion produced by the presence of a quantity of water in the stomach while the food was still there. In the Agricultural School of the Department of Yonne a horse was fed 4 litres of oats and immediately watered. Shortly afterwards it was killed. About 1 litre only of oats was found in the stomach, swimming in the water, the rest having been washed into the intestines and so become lost for the purpose of nourishment. A second horse was first watered and at once fed with 4 litres of oats. After a quarter of an hour it was killed, when the whole of the oats was found in the stomach, and were seen to be already under the influence of the digestive juices. Similar experiments conducted by Veterinary Surgeon Marlot, without the animal being killed, showed that a mass of undigested oats was always evacuated if water was given immediately after feeding. He therefore concludes that horses should always be watered before feeding, and further recommends that they should not be fed at once after work, but should first be allowed to rest a little, and afterwards be fed with oats.—*Journal R. U. S. I.*

INFANTRY EXERCISES WITH EXPLOSIVES.

The *Revue du Cercle Militaire*, No. 27, states that the French infantry are about to carry out interesting and novel exercises in the use of explosives. According to the latest instructions for field work, each regiment of infantry, or battalion forming a corps, is to be exercised every year in the use of explosives for the destruction of railways and for demolitions of various kinds, and to this end each of the units specified is now allowed an annual supply of 100 petards and 75 detonators. The details of the practical exercises to be carried out with this material are to be prescribed by the army corps commanders.

FIELD ARTILLERY FIRE.

The *Militär Wochenblatt* has in a recent issue discussed the possibility of increasing the effect of field artillery fire by lessening the intervals between guns in action and thus bringing up more guns on any given lateral space than present conditions allow. The normal interval in Germany is twenty paces, the practical equivalent of our "full interval" of nineteen yards. According to German regulations guns are never placed at less than ten-pace intervals unless in very exceptional circumstances, such as the pursuit of a routed enemy, whose fire would not be likely to be profuse or accurate. Undue diminution of intervals is highly prejudicial to fire discipline and control; it also exposes the detachments to a greatly enhanced fire effect from the opposing forces. Examining the case of shrapnel shell, this is easily illustrated. The German "C-91" shrapnel well served and burst at the correct distance from its target scatters 300 missiles (bullets and shell fragments) with a maximum spread of twenty-four paces.

Such a shell burst on one detachment would only partially injure the next one; and, if the axis of the line of dispersion ran fair through the centre of one detachment, each of the neighboring ones at twenty-pace interval would most likely be untouched. If the intervals were reduced to ten paces, a similarly burst shell would sweep the ground occupied by three detachments. Owing to increased losses from fire and marked depreciation of fire discipline and control, the increased number of guns placed in action, when intervals are unduly diminished, does not tend to a proportionate increase in the intensity of fire effect. The question of reinforcing guns already in action by bringing up others on the same extent of front involves considerable difficulty. When more guns are considered desirable, and the lateral space available admits of no increase, it becomes necessary either to interpose guns in the intervals between those already in action or to close the latter together so as to make room for the reinforcement. In the first case it is evident that a mixture of commands would ensue, resulting in the extreme case in the wildest confusion. Thus, if one battery of six guns was in action with twenty-pace intervals, the number of guns in action would be doubled by the process of driving in the six guns of another battery midway in the intervals between the guns of the first. The senior major would presumably command the 12-gun battery thus arising. (By German regulations the command in such cases devolves on the major of the battery first in action, who has probably already "ranged" his battery.) The confusion of subalterns' commands would be hopeless, the problem of ammunition supply one of exceptional complication. The case of a German Abtheilung, equivalent to our division, a lieutenant-colonel's command, occupying twenty-pace intervals with thirty paces between batteries, is discussed by the German writer, who assumes a case in which only the bare space necessary is available—that is, 15 by 20 for gun intervals (three six-gun batteries at five intervals each), plus 60 (two thirty-pace intervals between batteries), equal to 360 paces. He considers that the best results in reinforcing in extreme cases on such an alignment would be produced by bringing up not more than two other batteries. The calculations for five batteries runs—five batteries at twelve-pace intervals, $15 \times 60 = 300$ paces. 360–300=60 paces are left for intervals between batteries, four of these being required a fifteen-pace interval results. In the 1870-71 campaign at Metz, on August 18th, according to Hoffbauer, some batteries—Second Corps—placed single guns in the intervals between the Westphalian batteries already in action. The twelve-pace interval is not recommended. It seems probable that little increased fire effect would result from such crowding. Where guns in action are required to close together to make room for more guns coming up, the closing can, of course, either be effected on a flank or on the centre, the latter movement being, perhaps, preferable; in either case interruption of fire would result. The *Militär Wochenblatt* has the temerity to discuss artillery fire in two ranks, batteries on the same level firing over those not less than 300 yards or so in front. With the German field-gun trajectory this would allow of shell flying some twenty-five or thirty feet above the heads of the advanced battery. The article (August 30th) from which we derive these particulars is of considerable interest.—*United Service Gazette.*

XUM

Reviews and Exchanges.

The Art of Subsisting Armies in War.*

THIS interesting compilation must have cost the author much midnight oil. Indeed the "works from which this book was compiled" (vii) would constitute a very fair professional library. Still the compilation is not satisfying. The mind of the reader is started on a certain scent by the title of the work, and being in constant expectation of flushing something new on the next page, skims over what he considers only introductory matter, and finally lands in disappointment. The game he started in pursuit of is not there. "The Art of Subsisting Armies in War" is a subject of prime importance to every soldier, and the methods and machinery by which it was accomplished in ancient, mediæval, and modern times—the evolution of the art—would be an interesting study to anybody. We confess to some disappointment after reading this book. We are told that there were very large armies in ancient times, and that they had to be fed, and therefore must have had some kind of a subsistence department. Alexander the Great, no doubt copying more ancient commanders, utilized the civil magistrates in the collection of supplies; but how the collection was accomplished; whether it was a game of "grab all," or regulated upon equitable principles does not appear. So also throughout the historic period, the picture presented is far from complete. The details have always to be filled in by the imagination. Surely the materials exist for a complete picture, say of Frederick the Great's magazines and meal-carts, and their management. From the methods of such a master the evolution of the art of subsisting armies in war might be traced with certainty and satisfaction. But to go groping into the midnight darkness of prehistoric times for a starting point is unnecessary, and, we believe, unwise.

The author has some strong convictions on certain mooted questions about the feeding of troops, which flash out on the slightest provocation, and sometimes without any. Thus in his preface (iv) he characterizes the post mess as a "vicious system of subsisting a command." This is such a sweeping condemnation of the policy of the War Department, that one hesitates to accept it without proof. The system is new, but we hope not vicious. May it not be a step in the evolution of that art of subsisting armies, which the author undertakes to discuss? It has some strong points in its favor. It ought to diminish the impedimenta of armies. The necessity for ten separate and distinct cooking kits in a regiment is at least debatable. Moreover, it is asserted that company cooks put more men *hors de combat* during our last war than the enemy did. The post mess is only a conglomeration of squad messes; and squad messes are the field messes of the future. The art of preserving cooked food has reached a stage of development which justifies the hope that in future wars well cooked, nutritious, wholesome food will be distributed to soldiers in the field as easily as ammunition. And the post mess seems to be a step in that direction.

The Introduction, covering the first twenty three pages of the book, might serve

* *The Art of Subsisting Armies in War.* By Captain Henry G. Sharpe. John Wiley & Sons, New York, 1893.

as an introduction to a work on Strategy or Grand Tactics without altering a word It certainly has no special reference to the Art of Subsisting Armies in War, or at any other time. The question of supply is undoubtedly a controlling factor in strategical problems. Resources must be considered before any campaign is undertaken. But the great question of collection and distribution devolves upon the staff, after the campaign has been determined on. The solution of this question demands talents of a high order, but different in kind from those which deal with the question of resources.

On page 26 we find a novel idea. The author proposes that the commanding general of an army should be relieved from the necessity of looking out for his rear. This duty, he thinks, should be laid on the shoulders of a "General of Communications" who should order and regulate "everything which takes place in rear of the field army." A capital idea, but impracticable. Two commanders in the same theatre of operations is an impossibility.

We read (p. 33) that "in nearly all the armies of Europe the Transport forms a branch of the Subsistence Department." We presume the author means "Supply Department." Such an organization has many advocates in our army, but the efficiency of our present organization during our last war is a strong argument in favor of letting things alone.

The chapter on Transport is interesting and instructive and gives one some idea of the impedimenta of an army; but any one who remembers the condition of Virginia roads from 1861 to 1865, will hesitate before recommending traction engines for army transport.

As might be expected from the names of the works consulted in the compilation, the questions of supply are viewed and discussed entirely from the European standpoint. The greater specialization of our supply departments may and may not be an advantage; but they answered the purposes of their existence excellently well during our great war, and should not be condemned because some militiamen could not make them work at Buffalo. (p. 68.) No system, however excellent, can be operated successfully without a master. There may be many explanations of the mismanagement of subsistence matters at Buffalo, N. Y., in 1892, and a cautious compiler would hesitate before declaring the system by which armies of over a million of men had been successfully supplied, as the special cause of that particular failure. And it is not apparent what the post mess had to do with it. The post mess is merely a means of cooking and serving the Government ration. It has nothing to do with supplying it, and the Subsistence Department has nothing to do with it.

We find several passages marked for comment in the chapter on magazines, but pass them by as sufficiently covered by what has already been written. The one point, however, which cannot be passed is, that American experience, which has done more to solve the problems of logistics than any other to be found in history hardly receives honorable mention. The supply of the Army of the Potomac during the campaign from the Rapidan to the James, hastily sketched by the author in five pages (99-104) is one of the finest specimens of army supply to be found in history. And it does not stand alone. Grant's campaign in rear of Vicksburg and Sherman's March to the Sea, present problems in supply, the solution of which would test the merits of any system; and ours was equal to the occasion every time.

The subject of Requisitions is a difficult one to handle. They cannot be justified, except on the ground of necessity; and when that answer is entered there is nothing more to be said. In an enemy's country, however, they may be resorted to, not because necessity compels, but to ruin the country in the interests of peace. In the olden time, when the royal game of war was generally the result of royal ambition, a senti-

XUM

ment grew up, and acquired the force of law, that a non-combatant should not be made to suffer in person or property because of war. But the power of democracy has destroyed the foundation upon which that sentiment rested. The people, speaking through their representatives, declare war and make peace. They have no right then, to the sentimental exemption from the horrors and hardships of war. They are parties to the quarrel, and instigators and fomenters of the strife. They should therefore take the consequences of their own act.

But we have carried our comments beyond the usual limit. We have enjoyed the book, although we repudiate the title. We should like to christen it anew, The Beginnings and Development of Military Administration.

JAMES CHESTER,
Captain 3d Artillery.

General Greene.*

To the student of history of the idealistic or romantic school, who hates realism, who loves to view the founders of a great people through the haze of ancient fable and tradition until they assume the aspect and proportions of demigods, who believes in Romulus and Remus, in Hengist and Horsa in William Tell, in the heroes of Walhalla and the Niebelungen Lied—to all such it cannot be denied that the early chapters in the history of our own nation lack much of the interest that attaches to the records of similar periods in the history of the world. Our beginning is too recent. The heroes of our earliest struggles were the contemporaries of our grandfathers, or, at furthest, of our great-grandfathers. They have left us, many of them at least, the fullest account of their actions and, intentionally or otherwise, have laid bare to us, with the utmost freedom, the motives which inspired these actions. They belonged to the Eighteenth Century world of memoir-writers and letter-writers. We therefore know them, as a class, as no one individual of them could have been known by his most intimates friends and comrades.

And the fullness of this knowledge makes us sometimes long for the legendary heroes of other nations, from whose glory time has washed all stain. The student of the Revolutionary period is at times tempted to throw aside his work in disgust. He dreads to lift the veil which he knows will reveal so many petty jealousies, so much mutual hatred, the treachery, the disloyalty, the despicable meanness of soul that seemed to be the necessary counterpart of immortal self-devotion and self-sacrifice. He thinks of Adams gnawing his fingers while black envy was gnawing at his heart, as, from the window of his solitary lodgings, he looks at Washington passing through the street on his way to the army of which he had been made Commander-in-Chief. He thinks of the unceasing jealousy of the civilians and of the Congress towards the Continental officers, of the long years of intrigue among many of these officers to supplant the only one of them who was capable of saving the necks of all from the hangman's noose. Indeed, when we consider the heroic exertions and sacrifices of the few, and contrast them with the lukewarmness, the coldness, and not infrequently the active opposition of the many, during that trying period, it would almost seem that the American people had liberty forced upon them in spite of themselves. We are reminded of the stories which Nepos tells us of the ancient worthies of the Athenian and Spartan republics; how when any man in his exertions to secure the liberty of all, raised himself to a proud eminence over his fellows, as a general, an admiral, or an administrator, the whole state formed a cabal to degrade him to the common level. It was left to a republic younger than our own to inscribe over the portals of its Pantheon the words "*Aux grands hommes la patrie reconnaissante.*"

**Great Commanders—General Greene.* By Francis Vinton Greene. D. Appleton & Company, 1893.

Nevertheless, although our early history is thus checkered with lights and shadows, it is well that we know the facts, good and bad, as they are, since the shadows do but bring out in bolder relief the features of that immortal group who led our first steps in the path of liberty.

In this group no figure, save only one, is nobler than that of the man whose name is the subject of the volume before us. We owe an especial debt of gratitude to Colonel Greene for the striking and faithful portrait which he has presented to us of his great ancestor. It is a face upon which the eyes of the patriot linger in loving and reverent contemplation. On every lineament is written the love of country, the personal loyalty, the stern uncompromising devotion to duty which made Nathaniel Greene the foremost of that small band whose names will be forever associated with the name of Washington.

In the opening chapters the author rapidly sketches the antecedents and education of his subject and his life in Rhode Island until, perhaps to his own amazement, as well as that of others, he was selected to command all the troops of the Colony at the outbreak of the struggle which had been so long preparing. His ancestors had followed Roger Williams into the wilderness to found a little colony whose glory it is that their opinions are "now the foundation principle of government among more than one hundred millions of English-speaking people scattered over the four quarters of the globe." The author thinks that too little credit has been given the services of this little community in the establishment of civil and religious liberty. But it may be said, in passing, that in the great religious denomination of the Baptists—whose very name from the time of Cromwell's Independents until to-day is synonymous with the long struggle for liberty of conscience—the name of Roger Williams is revered as few mortal names are, and this too, for his services in the cause of "civil and religious liberty."

In his early youth Greene was distinguished by that characteristic of all powerful minds, an eager, restless, all-consuming desire for knowledge. He was brought up in the Society of Friends and soon mastered all the meagre literature tolerated in that body of enthusiasts. He then formed an acquaintance with Lindley Murray, the future grammarian and through his kindly assistance and that of one or two others he became acquainted with Locke on the Understanding, Watt's Elements of Logic, and Euclid. Later he diligently studied the Standard Law Dictionary of the day, and Blackstone. In later years probably the best library he possessed was composed of about two hundred and fifty volumes, of which the most carefully studied were "English and Roman History, Vattel and Hume, translations of Homer, Cæsar, and Horace, Butler's Analogy, Plutarch's Lives, Turenne's Memoirs, Ferguson's History of Civil Society, the Spectator, Pope, Swift, and Sterne." It is interesting to note this list, for Greene is one of the many illustrations of the singular fact that men with a certain peculiar quality of mind seem able to prepare themselves in the solitude of their library to occupy the most exalted positions in war. They prepare themselves to be successful generals when no amount of book study will make a successful chief of battalion.

General Greene joined the army at Boston on June 3, 1775, where he soon acquired the reputation of having the best drilled, disciplined and equipped body in the Colonial forces. Here began the friendship between himself and Washington, which, based on mutual respect and esteem, was never broken during the gloomy years that followed.

In the spring of 1776, after the evacuation of Boston, he was transferred to Long Island where his talents as an engineer and artillerist became conspicuous. Here, while lying at death's door with a raging fever his troops suffered a crushing defeat,

XUM

followed by the retreat which as he told his brother, "was the best effected he had ever read or heard of."

This was quickly followed by the disaster at Fort Washington on the North River. Then comes the account of the campaign in the Jerseys with the brilliant successes at Trenton and Princeton, with the sharp collision between Greene and the Congress on the question of the promotion of a French officer to be chief of artillery, as an interlude before the Brandywine campaign.

The author gives us a pleasing account of the social life of the officers and their families during the winter quarters at Valley Forge. He tells us of the *musicales* (cards were tabooed and there was no place to dance) and the gay subalterns' dinners to which no one was eligible who owned a whole pair of breeches. At this point a slight exception may be noted to the author's criticism of Duponceau's judgment as to Mrs. Greene's accomplishments. Duponceau, who was Steuben's secretary, describes Mrs. Greene as "a handsome, elegant, and accomplished woman, whose dwelling was the resort of foreign officers, because she spoke the French language and was well versed in French literature." The author calls attention to the fact that Mrs. Greene's husband had to caution her to be particular in her spelling and infers therefrom that it was improbable that she could be well versed in the French language and literature and that Duponceau's praise was the exuberant enthusiasm of a lively young Frenchman. This explanation is hardly in keeping with what we know of men and women who, for their time, were properly regarded as well educated people. Bad spelling at that time was characteristic of all except the professional *litterateurs*. A woman might speak French very well and spell English very badly. We know that many of the fine ladies of Newport at this time conversed fluently in the French language who would not have cut much of a figure at a "spelling-bee."

It was at this period that Washington effected very important changes in the Staff of the Army. Steuben was appointed Inspector-General and after much negotiation Greene consented to accept the position of Quartermaster-General. While in doing this he did violence to all his military predilections, it is safe to say that in no other position could he, at that juncture of affairs, have done so much for the salvation of his country. It is impossible in this short notice to go into details of his work in this position. The reader will find them in those chapters of Colonel Greene's work devoted to the subject. Suffice to say that he found an army without transportation, without clothing, without tents or forage. After ceaseless labors the result was summed up in a subsequent letter of General Washington to him in which he says, "* * * by extraordinary exertions you so arranged it as to enable the army to take the field the moment it was necessary and to move with rapidity after the enemy when they left Philadelphia."

After two years service as Quartermaster-General, accompanied by much bickering and friction with Congress, Greene resigned this position and after duty on the court which tried Major André he was appointed to the command of West Point. Hardly had he assumed his duties here than, after having been Washington's right hand for more than five years, he was hurried away to take command of the Southern Army. No higher proof of the confidence of Congress and of his immediate chief in his abilities could have been given. The command which he now assumed was practically independent and for the next year, as events proved, was in no wise inferior to that held by Washington himself.

In the final chapters of Colonel Greene's work is given a succinct account of the Southern campaign of 1781–1783 upon which General Greene's reputation as an independent commander must chiefly rest. Upon his arrival at Charlotte he boldly took the initiative against Cornwallis and one of the first results of his operations was the

victory of Morgan at the Cowpens. Then came in succession the masterly retreat to the Dan and the battle of Guilford Court House; the battle of Hobkirk's Hill, the siege of Ninety Six and the battle of Eutaw Springs—"a most bloody battle, by far the most obstinate fight I ever saw," Greene wrote to Washington.

The battle of Eutaw Springs was fought on September 8, 1781, Yorktown surrendered on the 19th of October. These two events practically terminated the war, although the evacuation of New York did not occur until November 25, 1783.

With the subsequent events of the life of General Greene we need not here concern ourselves. But it is a life well worthy the contemplation of every patriot, both civilian and soldier. And to the American soldier especially the name of Nathaniel Greene will always be an inspiration in peace and war, synonymous as it is with the purest patriotism, with hatred of tyranny and oppression, with unswerving devotion to duty, with undying loyalty to his chief and to the cause in which he fought so hard and for which he sacrificed so much.

T. H. B.

Continuous Current Dynamos and Motors.*

This work, intended for students, gives the theory and design of continuous current dynamos and motors as understood and practised in the designing room, and the methods of testing described are those of the factory testing room. The practical side of various questions treated is always kept in view, discussions having little bearing in this direction being excluded, as well as the descriptions of different machines and systems which are so often used to pad out the pages of similar treatises.

The first four chapters consist of a brief review of the electrical units and the general principles of the machines, and may be considered as an introduction to the subsequent portions; the higher branches of mathematics have been avoided here, as elsewhere. Chapter V. is on calculations pertaining to the magnetic circuit. Chapter VI. treats of the theory of windings, losses, etc., and Chapter VII. of the special points to be observed in motor designing.

In Chapters VIII., IX. and X., the application to the design of armatures, field magnets and motors of the principles developed in the preceding chapters is explained by reference to numerical problems selected so as to cover as broad a field as possible and show in what manner to make the various compromises always necessary in practical designing.

In Chapters XI. and XII., the methods of testing a completed machine and investigating its characteristics and the effect of various changes in design and operation are very fully discussed and illustrated by numerous curves.

As the subject of steam engines is one so closely allied to the testing and operation of dynamos and motors, the last two chapters are devoted to indicator diagrams and steam power calculations, which are treated in the same eminently practical manner as the purely electrical subjects.

The four appendices are on tests of irons, ampere-turn tables, determinations of sizes of wire for armatures and field coils, and on the calculation of belting.

With one exception all of the engravings were especially prepared for this work, and almost all of the numerous curves are reproductions of those obtained in actual commercial tests.

---

* *Continuous Current Dynamos and Motors.* Their Theory, Design and Testing. With sections on Indicator Diagrams, Properties of Saturated Steam, Belting Calculations, etc. An Elementary Treatise for Students. New York: The W. J. Johnston Company, Limited, 41 Park Row (Times Building), 1893. 271 pages, 83 illustrations. Price $2.00.

Duties of Outposts.*

The object of the author in preparing this manual was to combine and arrange in a clear but concise manner the opinions of the best modern authorities upon the subject of Grand or Exterior Guards, under which head is included outposts, advance and rear guards, reconnaissance, raids, and escorts of convoys.

In conjunction with this material is produced the complete manual of Guard Duty, U. S. Army, thus placing under a single cover all that pertains to both interior and exterior guard duty. The advantage and propriety of uniting these kindred subjects in a single volume of convenient size are apparent.

Standard modern works such as Hamley's Operations of War, Shaw's Elements of Modern Tactics, Clery's Minor Tactics, Home's Précis of Modern Tactics, Gordon's Outpost Duty. etc., have been freely consulted, and may be said to form the basis of this hand-book. The work also conforms to our Drill Regulations and Revised Manual of Guard Duty, and is as purely American in other respects as possible.

The need of such a work in our service must be admitted by every American soldier. As a rule both the Regular and State troops are well drilled and instructed in all that pertains to target practice and interior guard duty. But both are sadly deficient in the practical application of the elements of modern tactics.

It cannot be denied that there is scarcely a military post or a State camp that so far as ground is concerned, does not afford facilities for teaching in a practical manner all that pertains to the duties of Grand Guards. Our late war affords many examples of how imperfectly the duties of outposts were performed.

A perusal of Lieut. Burnham's hand-book cannot but be of advantage to any officer whether of Regular or National Guard service.

The book, combining as it does the duties of outposts with the authorized manual of guard duty, should be in the hands of all National Guard officers to whom it should prove most convenient and valuable, especially so if they have not the time to devote to Captain Wagner's larger and more detailed work.

Speeches and Addresses of William McKinley.†

In this volume are presented sixty-five of the speeches and addresses of Hon. William McKinley, Governor of Ohio, late Representative in Congress, and one of the prominent public men of the country.

It has been compiled by Mr. Joseph P. Smith, Librarian of the Ohio State Library, and revised by Mr. McKinley himself, so far as the opportunities of a busy public life would admit.

The selections have been made from several hundred speeches, delivered in all parts of the country, and indicate the wide range of topics on which Mr. McKinley has spoken.

Especial attention is called to the care and ability with which he has discussed the tariff question. All his more important tariff speeches are here collected in a single volume, and his arguments must prove especially interesting at this time, when the matter of adhering to or abandoning our present economic policy is the main question at issue between the two great political parties of the country.

**Duties of Outposts with Manual of Guard Duty, U. S. Army.* By Lieut. W. P. Burnham, 6th U. S. Infantry. C. W. Bardeen, Syracuse, N. Y.

† *Speeches and Addresses of William McKinley.* D. Appleton & Company, 1893. $2.00.

Maynard's English Classic Series.*

Each number of this series contains some separate work or portion of work by an author whose writings have become classic in English literature.

We find, for instance, Byron's Prophecy of Dante (Cantos I. and II.), Milton's L'Allegro and Il Penseroso, Irving's Legend of Sleepy Hollow and Macaulay's Lord Clive.

The single numbers, 32 to 64 pages, are mailed for the low price of 12 cents, the double numbers for twice this amount.

The two numbers before us—Macaulay's Essay on Frederick the Great and Motley's Peter the Great—are printed clearly in convenient form and bound in boards, uniform with the other numbers.

Special numbers at a slightly higher price contain such works as Chaucer's Canterbury Tales, Milton's Paradise Lost, etc.

The whole series forms an excellent selection from what is best in English literature and though low in price is well presented both as to form and type.

---

* *Maynard's English Classic Series.* Maynard, Merrill & Co. New York, 1893.

ARTICLES ACCEPTED FOR THE JOURNAL.

Marathon. By MAJ. JOHN BROOKE, Surgeon U. S. A.

The Management of a Post Hospital, By MAJ. J. VAN R. HOFF, Surgeon U. S. A.

Suggestions for Consideration Relative to the Q. M. Dept., By LIEUT.-COL. J. G. C. LEE, Q. M. Dept.

The Medical Department of the Army, By MAJ. CHARLES SMART, Surgeon U. S. A.

Outlines of a South American Revolution, By LIEUT. J. H. SEARS, U. S. Navy.

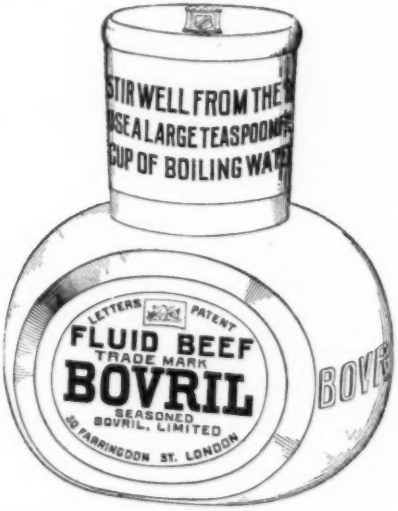
XUM

XUM

Bovril . . .

is the Finest Fluid Beef.

Contains all the nutriment of finest Ox-Beef. Has the flavor of delicious Roast Beef. Dissolves instantly. It is more than a stimulant, it is a food.



ECONOMICAL. INDISPENSABLE.

Be sure to buy Bovril Best Bouillon.

BOVRIL, Limited, London,
FOOD SPECIALISTS,
55 Franklin St., N. Y.

1326 (a)

XUM

THE AMERICAN CEREAL COMPANY

AKRON, O.

MANUFACTURER OF

Schumacher's Rolled Avena and Oatmeal

Desires the more extensive introduction to the Army of the U. S. of all its Standard Cereal Products

SUCH AS

Farina and Parched Farinose,
Rolled and Cracked Wheat,
Family Flour and F. S. New Process,
White Wheat Graham and Rye Flour,
Coarse and Granulated White Hominy,
White and Yellow Granulated Cornmeal!

ALSO

Schumacher's Infant Food!

The best balanced Cereal Product for the rational nourishment of children and convalescents. A sample and comparative table showing analyses of several leading Infant Foods, furnished free or a pound package by mail or express on receipt of sixty cents.

Dr. J. J. Sullivan, of New York City, in his "Diet After Weaning," says:

As a rule the weaning of a child should be commenced when the process of teething is fairly established. As soon as nature provides the child with teeth it is better for both mother and child that it be weaned. The infant should not, however, be weaned from the breast in too sudden a manner, as any abrupt change of diet is very apt to derange the digestive organs and give rise to diarrhœa or cholera infantum.

The diet of infants at this particular period of life has received a large share of professional attention during the past ten years. Foods of various kinds have been introduced into the market, and I have thoroughly tested them all. I have found Schumacher's Infant Food to be the most perfect and rational food that has ever been introduced to the profession. It has by far the largest percentage of albuminoids—brain and muscle making material. It is palatable, nutritious, and wholesome, and does not overtax the digestive organs of young children, producing those disturbances of the stomach that usually attend the early months of life. It acts not only as a food, but as a corrective medicine, and prevents those troubles of the bowels known as colic, summer complaint, etc.

After using fifty pounds of Schumacher's Infant Food I cannot speak too highly of its beneficial results. Using previously several largely advertised foods our daughter was progressing poorly, being small and puny, with no evidence of growth whatever. Within four days after we commenced using your food we noticed a marked change. Baby became active, bright, and started to grow rapidly, until now, some ten months after, she is as plump and healthy a child as can be found anywhere.

Yours gratefully,

N. AMSTUTZ, Cleveland, O.

U.M.C.
TRADE MARK.

MILITARY CARTRIDGES

—FOR—

United States and Foreign Government

ARMS.

PAPER AND BRASS SHOT SHELLS, WADS,

PRIMERS, ETC., ETC.

GOVERNMENT CONTRACTORS

The Union Metallic Cartridge Co.

BRIDGEPORT, CONN.

HARTLEY & GRAHAM, New York Agents.

313-315 Broadway, New York.

CABLE ADDRESS, HARTLEY, NEW YORK.

1326 (c)

COCILLANA

IN RESPIRATORY INFLAMMATIONS.

It gives us pleasure to announce to the profession that, although we have for two years been unable to obtain any stock of Cocillana, we can now supply this Bolivian remedy, which experience has proved to be of marked therapeutic value in the Inflammations of the Respiratory Organs, in Coryza, Bronchitis, Hay Asthma, Influenza, Pneumonia. It has also laxative and purgative qualities, and has been employed successfully as a substitute for Ipecac and Apomorphine in Catarrhal conditions.

Furthur experiments and clinical reports are desired, and samples of Cocillana and reprints of the papers published will be supplied on request to physicians wishing to test its virtues, who will pay express charges on sample.

Send for complete descriptive literature of our newer remedies for respiratory affections.

SAW PALMETTO.

(SERENOA SERRULATA.)

In an article quoted in the *Medical World* from the *Pacific Record of Medicine and Surgery*, it is stated :

The fluid extract of this invaluable berry is a nutrient tonic, far in advance of the hypophosphites. It has a special action upon the glands of the reproductive organs, the mammæ, ovaries, prostate, and testes. Its action is that of a great vitalizer, tending to increase their activity, to promote their secreting faculty.

It is specially indicated in all cases of wasting of the testes, such as follows varicocele or is induced by masturbation, or which is often present in sexual impotency.

In atrophy of the prostate, so very common in cases of sexual perversion, this drug operates in a most remarkable manner, in overcoming the withered, blighted state of the gland ; so in uterine atrophy dependent upon ovarian blight its action is unexcelled. In gynæcological practice it is much used to promote the growth of the mammæ. It is of special value in diseased conditions of the prostate due to masturbation, excess, perversion of the sexual act, sedentary habits, or improperly treated gonorrhœa.

We shall be pleased to supply samples to physicians wishing to test this remedy who express a willingness to pay express charges.

PARKE, DAVIS & CO.

DETROIT, NEW YORK, KANSAS CITY, and WALKERVILLE, ONT.

XUM

XUM

Announcement.

THE following resolution was proposed by the Publication Committee, and unanimously adopted by the Executive Council of the Military Service Institution, at its regular meeting on the 8th day of September, 1893.

Whereas, an agreement was duly made in July, 1890, with Charles E. Merrill & Company, that the Military Service Institution shall supply Historical Sketches of the Army of the United States, subject to the conditions that the total number of pages in type shall not exceed five hundred, and that the delivery shall be on or before January 1, 1893 :

And whereas, the time of said contract has expired, and the Company is consequently put to expense not contemplated in the agreement :

And whereas, every effort has been made to hasten the preparation of the records by officers of the several organizations, but thus far with only partial success :

Now, therefore, be it resolved : That the Secretary of the Institution be requested to prepare from official documents such summaries as may be practicable, in the case of organizations which have not furnished such records on or before January, 1894, and that the agreement of the Institution be thus fulfilled.

XUM

The Military Service Institution.

President.

Major-General JOHN M. SCHOFIELD, U. S. Army.

Resident Vice-Presidents.

Major-General O. O. HOWARD, U. S. A. — Bvt. Brig.-Gen. T. F. RODENBOUGH, U. S. A.

Secretary. — *Treasurer.*

Major W. L. HASKIN, 1st U. S. Artillery. — Lieut. J. C. BUSH, 5th U. S. Artillery.

Asst. Secretary and Vice-Treasurer.

Lieut. C. G. TREAT, 5th U. S. Artillery, A. D. C.

Executive Council.

Term ending 1899.

COMLY, C., Maj. Ord. Dept.
(Vacancy.)
KINGSBURY, H. P., Capt. 6th U. S. Cavalry.
PAGE, C., Col. & Asst. Surgeon-General.
TOMPKINS, C. H., Colonel A. Q. M. G., B.-G.
WEBB, A. S., Bvt. Major-General, (late) U. S. A.

Term ending 1897.

BARRIGER, J. W., Lt.-Col. Sub. Dept. B.-G.
BATES, A. E., Major Pay Dept.
BRECK, S., Lt.-Col. Adjt.-Genl's Dept., B. G.
HUGHES, R. P., Colonel, Insp.-General.
(Vacancy.)
WOOD, E. E., Professor, U. S. Mil. Academy.

Term ending 1895.

Finance Committee.
Gen. TOMPKINS,
Gen. BARRIGER,
Col. BARR.

ABBOT, H. L., Col. Corps Engineers, B.-G.
BARR, T. F., Lieut.-Col. D. J. A. G.
BREWERTON, H. F., Major U. S. A.
NOWLAN, H. J., Capt. 7th U. S. Cavalry.
PENNINGTON, A. C. M., Lt. Col. 4th Art. Col.
WETHERILL, A. M., Capt. 6th U. S. Infantry.

Library Committee.
Col. PAGE.
Col. PENNINGTON.
Capt. WETHERILL.

Publication Committee.

General ABBOT, Colonel HUGHES, and Lieut. BUSH.

Branches.

(In the order of their establishment.)

Vancouver Barracks, Wash.

Vice-President.

Colonel T. M. ANDERSON, 14th U.S. Infantry.

Corresponding Secretary.

Capt. CHARLES MCCLURE, A. J. A.

West Point, N. Y.

Vice-President.

Col. O. H. ERNST, Corps of Engineers.

Corresponding Secretary.

Lieut. JOHN P. WISSER, 1st U. S. Artillery.

Fort Leavenworth, Kansas.

Vice-President.

Bvt. Major HUGH G. BROWN, Capt. 12th U.S.Inf.

Corresponding Secretary.

Lieut. C. H. BARTH, 12th U. S. Infantry.

Denver, Colo.

Vice-President.

Bvt. Major-General A. MCD. MCCOOK, U.S.A.

Corresponding Secretary.

Lieut. JOHN E. MCMAHON, 4th U. S. Artillery.

Membership dates from the first day of the calendar year in which the "application" is made, unless such application is made after October 1st, when the membership dates from the first day of the next calendar year.

"*An Entrance Fee of Five Dollars* ($5) shall be paid by each Member and Associate Member on joining the Institution, which sum shall be in lieu of the dues for the first year of membership, and on the first day of each calendar year, thereafter, a sum of not less than *Two Dollars* ($2) *shall be paid as annual dues. Annual dues* commence on January 1st in each year."

NOTE.—Checks and Money Orders should be drawn to order of, and addressed to, "The Treasurer Military Service Institution," Governor's Island, New York Harbor.

Changes of address should be reported promptly.

XUM

XUM

Maillard's

VANILLA

CHOCOLATE

An extremely soluble beverage, with absolutely *no sediment* or *particles of oil*, and will make a *highly delicious, exquisitely flavored* and *easily digested* cup of chocolate. There are four grades — Half, Single, Double and Triple Vanilla flavor — put up in ¼ lb. packages, and sold by GROCERS EVERYWHERE.

-THE BEST MADE-

Maillard's

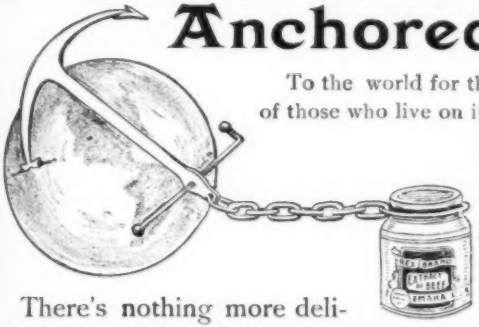
BREAKFAST

COCOA

This Cocoa is *easily prepared, absolutely pure* and *thoroughly digestible* Its superior quality and *moderate price* will commend it to all who use Cocoa. Put up in ½ lb. tins only, with red label, and sold by GROCERS EVERYWHERE.

-THE BEST MADE-

Anchored



To the world for the pleasure and good of those who live on it—

Cudahy's Extract of Beef,

—Rex Brand.

There's nothing more delicious and healthful than a cup of bouillon made from this product. It's relished alike by invalid and athlete.

Every grocer sells it. Rex brand makes the most appetizing sauces, soups, etc.

Send 6 c. for postage on sample can—mailed free.

THE CUDAHY PHARMACEUTICAL CO.,

South Omaha, Nebraska.

1328 (a)

GOLD MEDAL, PARIS, 1878.

WALTER BAKER & CO.'S

BREAKFAST COCOA

FROM WHICH THE EXCESS OF OIL HAS BEEN REMOVED.

IS ABSOLUTELY PURE AND IT IS SOLUBLE.

No chemicals are used in its preparation. It has MORE THAN THREE TIMES THE STRENGTH of cocoa mixed with starch, arrowroot, or sugar, and is therefore far more economical, COSTING LESS THAN ONE CENT A CUP. It is delicious, nourishing, strengthening, EASILY DIGESTED, and admirably adapted for invalids as well as for persons in health.

Ask Your Grocer for it. Allow no Substitution.

WALTER BAKER & CO., DORCHESTER, MASS.

1328 (b)

XUM

XUM

SIXTEENTH REGIMENT OF INFANTRY.

By Captain WILLIAM V. RICHARDS, 16th U. S. Infantry.

FROM the close of the War of the Rebellion to the year 1869, no branch of the public service seemed more unsettled than the regular army. While the memory of the Civil War was fresh in the minds of our legislators a standing army of moderate strength seemed to be a national necessity. The want of an efficient military force in 1861 resulted in the sacrifice of thousands of lives, millions of treasure, and for a time threatened our national existence.

The narrow escape from so dire a calamity infused into the minds of Congress the wisdom of providing against a recurrence of such danger, hence the permanent establishment was fixed at ten regiments of cavalry, five of artillery and forty-five of infantry. Four of the latter were designated as "Veteran Reserve Corps"; intended, very wisely I think, to provide for soldiers and officers who had become partly disabled during the war by reason of wounds received, but who could perform garrison duty, or in time of war defend the inner fortifications or act as a basis for the organization of a large army;—a body of trained though maimed soldiers, who could perform all the necessary military duties in the rear, allowing the use of the entire active army at the scene of action. The organization of these regiments, together with bands, non-commissioned staff unattached to regiments, and 410 Indian scouts, provided for an army of 80,832, full strength, but was placed on a peace basis of 52,948.

Thus the organization was complete for an army that would be of sufficient strength to quell almost any disturbance, while in case of extraordinary trouble, as in 1861, by simply increasing the enlisted strength of each regiment to its allowed maximum, an army of considerable magnitude was instantly at hand. In the light of the past and in the possibilities of the future surely this was wise legislation, but it required the stimulus of recent events, the remembrance of lost battles, the realization of the sacrifice of human life and vast treasure, the exposed fact of the nation's weakness and inability for self-preservation under ordeals such as the years 1861 to 1865, to spur the American people to a proper appreciation of the necessities of a nation for its security.

Time, the great obliterator of the past, removed the stimulus; policy, too often the curse of legislation, took its place. The cry for retrenchment was more potent than the plea for protection; new political aspirants rode into power upon this short-sighted, unwise plea for preferment. The veteran legislators who had guided the nation safely from dissolution and wreck were laid aside and forgotten under the influence of prospective lessening of taxes, and, as has been so often the case in our republic, the first branch of the national tree to suffer from the retrencher's axe was the army.

XUM

The army had no votes. The army had little patronage to swell the politician's constituency. The army at the present moment was needed only to keep off the savages of the plains from the civilization of the East. It was not needed much for that, as the East had little attraction for the savage; and had it not been for the western legislators who have always been the army's friend, and the occasional scalp of an eastern tourist, this branch would doubtless have been reduced to much smaller proportions than it was. Yet the elimination was tolerably effective. The forty-five regiments of infantry were reduced to twenty-five; the regiments of cavalry and artillery were left the same in number, but all were reduced to an enlisted strength of 25,000,—an aggregate of 28,764. To effect this, existing regiments of infantry were consolidated and this consolidation brings me to the object of this sketch,—the history of the present Sixteenth Infantry.

The Eleventh Infantry, organized May 4, 1861, and having on its battle flags, Gaines' Mill, Bull Run, Fredericksburg, Chancellorsville, Gettysburg, Wilderness, Laurel Hill, Spottsylvania Court-house, Cold Harbor, Petersburg, Weldon Railroad, and Chapel House, was consolidated with the Thirty-fourth Infantry, which had been the third battalion of the Sixteenth Infantry, organized on the same date as the Eleventh and having on its banners Shiloh, Murfreesboro, Chickamauga, Missionary Ridge, New Hope Church, Kenesaw Mountain, Neal Dow Station, Peach Tree Creek, Atlanta, and Jonesboro, each regiment possessing therefore a bloody and honorable record. Both regiments were doomed to lose their designation, but were allowed to retain the list of battles of each, consolidated on one flag. The new regiment was numbered the Sixteenth. It was consolidated by merging the enlisted men of one regiment with the company of the same letter of the other, and assigning the officers by rank as provided by the order of consolidation. This was effected March 3, 1869.

In making the assignment of officers in the new regiment the field officers were designated in the orders of the War Department. The staff was selected by the colonel without regard to the relative rank of the officers selected. The adjutancy was retained by the officer holding it in the 34th Infantry, and the position of quartermaster was given to the officer holding it in the 11th Infantry. The company officers were assigned so as to give as far as possible the same brevet rank to a company throughout its three officers. The non-commissioned staff of the 34th was retained entire. On the 3d of March, the roster of the new regiment was as follows:—

Colonel G. Pennypacker.

Lieut.-Col. Robert S. Granger.

Major William P. Carlin.

Captains Francis M. Cooley, Caleb R. Layton, James Kelly, Joshua S. Fletcher, Jr., Duncan M. Vance, Arthur W. Allyn, Hugh A. Theaker, W. H. Bartholomew, John Power, and W. G. Wedemeyer.

First Lieutenants Clayton Hale, William H. Clapp, Henry C. Ward, Allen Almy, Merritt Barber (Adjutant), Evarts S. Ewing, Stephen K. Mahon, Wallace W. Barrett, William H. Vinal, John McCoy, Charles H. Noble, and William V. Richards (Quartermaster).

Second Lieutenants Fred Rosencrantz, George B. Pickett, John F. Smith, T. W. Morrison, Charles Jordan, David P. Scott, George M. Love, Stanley D. Humason, Samuel R. Whitall, and Isaac O. Shelby.

The new regiment thus formed was stationed at six different posts, and was engaged in assisting the civil authorities in carrying out the provisions of the reconstruction acts of Congress. The headquarters of the regiment, with Companies D and I, were at Grenada, Miss.; the Lieut.-Colonel, with Companies B, E and G, were at Jackson, Miss.; the major, with C and F, at Vicksburg, Miss.; A at Natchez, Miss.; H at Lauderdale, Miss.; and K at Corinth, Tenn.

This extensive scattering of the regiment at this time was unfortunate, the two regiments coming together from distant parts of the country and the officers being unacquainted with each other. This want of personal knowledge of his regiment was felt more especially by the colonel, and care was taken by the new commander to remedy and allay any discordance that might exist. Frequent visits were made to all the posts both by the colonel and his staff, and by reason of these visits one of the chief disadvantages was in a short time overcome. The company officers became thoroughly acquainted with the headquarters of their regiment and an *esprit de corps* soon commenced to show itself, which gives to the regiment to this day a distinctive reputation. Probably there was no consolidation made at this time where these results were so necessary and at the same time so hard to obtain. The new colonel was the youngest in the army, an appointment from civil life but of most distinguished record, while the lieutenant-colonel and major were both old and distinguished officers, graduates of West Point. Many of the company commanders had seen as much service as the colonel, some having had as large commands during the war, but all seemed imbued with the desire to excel. The loyalty and regimental pride of Generals Granger and Carlin were particularly admirable, and I know personally that it was highly appreciated by their young commander.

From 1869 to 1877 the regiment was engaged in assisting the civil authorities in carrying out what was known as the reconstruction act of Congress, a most disagreeable and unmilitary duty. The companies of the regiment were called upon to act in unison but three times during the period mentioned. Once when Companies B, E, F, G, I and K, made a march in October, November and December, 1870, through Alabama, Georgia and South Carolina, under the command of General Carlin, for the suppression of the so called "Ku Klux Klan." Again, when Companies C and I, under the command of the gallant Colonel Rose (who had been assigned to the regiment in place of Captain Power, resigned) during the Brooks-Baxter embroglio at Little Rock, prevented what threatened at one time to become a most serious outbreak. This occurrence attracted at the time the attention of the nation. Fears were entertained that it might prove to be a national disaster, but the determined and energetic action of the commander, who had already a national reputation for energy, skill and nerve, averted the calamity without bloodshed.

The third time was when all of the regiment, except Company H, was

XUM

concentrated under the command of its colonel at New Orleans, during the Packard-Nichols troubles in 1876.

This ended the reconstruction service of the regiment. In the eight years in which it was so engaged its headquarters were at Grenada, Miss., Nashville, Tenn., Newport, Ky., Mount Vernon Barracks, Ala., and New Orleans, La. Its companies were stationed in Kentucky, Tennessee, Alabama, Mississippi, Louisiana and Arkansas. The duties imposed were performed conscientiously, though in nearly every case they were distasteful to a military man. While no open conflicts occurred yet they were imminent almost daily in some locality. While it is believed that the regiment made the power of the Government felt wherever it served, yet the recollection of this service brings with it no remorse for injustice done, power arbitrarily or unnecessarily used, or partisanship in any sense during its entire service in the South.

In 1877 the regiment was for the first time called to new, and what was considered the more legitimate, duties of the profession. Leaving the Southern States, and all the political complications involved in service there, we crossed the Mississippi and commenced our career in the Indian country. Headquarters, with Companies A, C and H, were stationed at Fort Riley, Kansas; K at Fort Gibson, Indian Ter.; B and D at Fort Sill, Indian Ter.; E and I at Fort Reno, Indian (now Oklahoma) Ter.; F at Fort Wallace, Kansas; and G at Fort Hays first and subsequently at Fort Wallace. For three years the regiment was stationed as above, except that I and K exchanged stations. During this time Companies D and H were with General Buell in the Victoria campaign through New Mexico and into old Mexico. Company H was detached and went as escort with a railroad surveying party through Arizona. Companies F and G were engaged in the pursuit of Cheyenne Indians who escaped from the Indian Territory and were not captured till they got to the sand hills near Fort Robinson, Neb.; Company A was engaged with these same Indians below Fort Dodge, Kansas. Companies C and G were with General Mackenzie in the campaign of 1870-80, and Company F made a campaign against the Utes into middle Colorado.

In 1880 the regiment was ordered to Texas and was stationed as follows: Headquarters and Company F, first at San Antonio, but soon afterward with D, E, G, H, I and K, at Fort McKavett; A, B, C and I, at Fort Concho.

In June, 1888, the regiment was moved to the Department of the Platte, Headquarters, with B, D, E, G, H and I, being stationed at Fort Douglas, and A, C, F and K, with the lieutenant-colonel in command, at Fort Duchesne, Utah. While stationed at these posts, individual service of Captain Rose and some enlisted men at Fort Duchesne was mentioned in orders, and Companies D, E, G and H, were engaged in the campaign against the Sioux Indians in 1891 which brings my sketch up to the present date, June, 1891.

Twenty-one years have wrought great changes in the personnel of the regiment. Only six officers who were on the original roster are now serving with it. Six went out by retirement; nine were dismissed or cash-

iered; two were honorably mustered out of service, and four are still in the service but are serving in different organizations by promotion or transfer.

The present colonel of the regiment succeeded Colonel Pennypacker on the latter's retirement in July, 1883. The lieutenant-colonels, since Lieutenant-Colonel Granger, have been James Van Voast, Alfred F. Hough and Wm. H. Penrose. The majors, since General Carlin, have been Samuel A. Wainwright, Charles A. Webb, Horace Jewett, and John B. Parke.

The adjutants, since Colonel Barber, have been Wm. V. Richards, William H. Clapp, Wm. H. Vinal, Leven C. Allen, Samuel W. Dunning and Charles R. Tyler.

The quartermasters, since Lieutenant Richards, have been William H. Clapp, Henry C. Ward, Evarts S. Ewing, Wm. V. Richards (a second time), William Lassiter, Thomas G. Woodbury and Warren H. Cowles.

Lieutenant-Colonels Van Voast and Hough were both promoted out of this regiment into the Ninth, but the former was injured while going to his new regiment and never joined it, retiring on account of his injury.

I am well aware of the fact that the foregoing is but a crude and meagre account of an organization that is held in high regard by those still remaining in it and by many still living who once were active under its banners. I cannot but wish that the compilation might have fallen to an abler and more worthy chronicler, but it is offered for what it is worth with the hope that in its pages there may be some matter that will interest the reader.

XUM

THE TWENTIETH REGIMENT OF INFANTRY.

By Captain J. N. COE, 20th U. S. Infantry.

THE Twentieth Infantry was organized by direction of the President, May 4, 1861, and confirmed by act of Congress July 29, 1861, as the second battalion of the Eleventh Infantry, the first, numerically, of the nine three battalion regiments organized under this act.

Its designation was changed by act of Congress of July 28, 1866, when by the addition of two companies to the eight which constituted the battalion, it became the Twentieth Infantry. Its designation and organization was completed and fixed under the act, by the provisions of General Orders No. 92 from the War Department, series of 1866, and was of effect from the 21st of September, 1866.

While as an organization perfected at this date the Twentieth Infantry can have no distinct war record, its officers (with hardly an exception) and a great number of enlisted men whose names appear on its original rolls, with many officers who have subsequently joined by promotion and otherwise, had served during the entire War of the Rebellion, and with marked distinction and gallantry, in such important and conspicuous positions that their military record had become a part of the nation's history.

At the time of this evolution or development of the battalion into a regiment (1866), it was, with the exception of Co. B (then at Union, West Virginia), stationed at Richmond, Va., under the immediate command of its major, Thomas H. Neill, Bvt. Brig.-Gen. U. S. A. As a part of the Eleventh Infantry, it had remained there from early in May, 1865, occupying the temporary but very comfortable (to troops that had endured four years of field service in actual warfare) location and buildings, then known as Camp Winder, later Camp Grant. In addition to the ordinary garrison routine, it had been performing the arduous and often disagreeable duties of provost-guard, patroling the streets of the city, and furnishing large details of enlisted men to act as a police force for the preservation of order and protection of persons and property.

The first field officers of the Twentieth Infantry were:

Colonel, Frederick Steele, Bvt. Major-Gen. U. S. A.

Lieut.-Colonel, Louis D. Watkins, Bvt. Brig.-Gen. U. S. A.

Major, Thomas H. Neill, Bvt. Brig.-Gen. U. S. A.

Its Captains were:

1. Alexander S. Webb,
2. Charles S. Russell,
3. Charles C. Pomeroy,
4. James M. Cutts,
5. Henry G. Thomas,
6. Charles E. Farrand,
7. John C. Bates.
8. Edward R. Parry,
9. John J. Hoff.

In January, 1867, the number of captains was completed by the appointment of Lieut. A. A. Harbach, regimental adjutant, to the remaining original vacancy.

In January, 1867, the regiment was transferred from Richmond to the Department of the Gulf and District of Louisiana, with headquarters at Baton Rouge, La., where it arrived on the first day of February, 1867, having remained for two or three days in New Orleans, from which point the companies were assigned to posts and stations. The journey by which the regiment reached its new stations in the Department of the Gulf, then commanded by General Sheridan, was performed by rail to Norfolk, Va., where it arrived about midnight on January 13th. On the morning of the 14th, its commander was notified that the regiment would embark at once on board the steamship *Missouri*, then ready to receive and transport it to New Orleans, but the prescribed inspection of the vessel, the construction of wooden bunks between decks for the accommodation of enlisted men, the provision of some very primitive and limited cooking facilities, and the stowing of baggage, occupied the entire day and until the afternoon of the 15th, when with headquarters and nine companies (B not having joined), band playing and colors flying, the *Missouri* steamed out past Fort Monroe. All were in high spirits, enjoying the scenery, and happy in the belief that in six or seven days they would be enjoying the delightful winter climate of Louisiana. But soon the sea became rough, weather very threatening, and in a few hours it was blowing a terrible gale accompanied by rain and hail.

The ship proved less seaworthy than she had appeared to the board convened for her inspection, and soon became disabled through breakage of some of her machinery, then sprung a leak, and after the storm of four days' duration had somewhat abated, the commanding officer was informed of the condition of affairs, and that the ship was a long way off her course; but the leakage and damage to machinery proved less serious than was supposed, and after a day's delay was repaired, and the ship proceeded on her voyage to the southwest pass of the delta of the Mississippi, and there stuck in the mud. After some delay a steamer of the Morgan Line was procured, the troops and baggage transferred, and after a delightful sail up the Mississippi the regiment disembarked at New Orleans on the 27th day of January, 1867. On the 28th, the following assignments to stations was made, and the organizations proceeded to them by companies or battalions direct from this point.

Lieut.-Col. L. D. Watkins, with headquarters and companies A and E (Captains Patterson and Fletcher), Baton Rouge, La.; Company B (Captain J. C. Bates, bvt. lieut.-col.), Alexandria, La.; Company C (2d Lieut. William Hawley, commanding), Marshall, Texas; Company D (2d Lieut. Stanton Weaver, commanding), Jefferson, Texas; Company F (2d Lieut. Charles Robinett) and Company I (Captain John J. Hoff), Ship Island, Mississippi; Company G (Captain Edward R. Parry), Fort Jackson, La.; Company H (Captain J. M. Cutts, bvt. lieut.-col.), Shreveport, La., and Company K (1st Lieut. John W. Hicks, commanding) to Fort St. Philip, La.

During the two years next succeeding, the regiment was employed on duties connected with the reconstruction of the States of Mississippi, Lou-

isiana, and Texas, with frequent changes of stations of companies within the District and Department.

Colonel Steele never joined, and Lieutenant-Colonel Watkins remained in command of the regiment until sudden death, at New Orleans, on the 29th of March, 1868, terminated the career of this brilliant and accomplished officer.

On March 20, 1868, Lieut.-Col. George Sykes, 5th Infantry, bvt. major-general, U. S. A., was attached to, and took command of the regiment, and in August following formally assumed command as its colonel,—in succession to Colonel Frederick Steele, whose death occurred on the 12th day of January of that year.

By G. O. No. 17, A. G. O., March 15, 1869, the regiment was transferred to the Department of Dakota, and in compliance with this order its companies, then widely scattered over the State of Louisiana, assembled and were rendezvoused at Baton Rouge.

On the 4th of April the entire regiment under command of its colonel (Sykes) embarked on the steamer *Pauline Carroll* for St. Paul, Minn., where it arrived April 20, then proceeded to and disembarked at Fort Snelling, Minn., where orders were received for the following assignments to stations: Headquarters, Band and Company E, to Fort Snelling, Minn.; A and G to Fort Ripley, Minn.; B and H to Fort Wadsworth, Dakota Ter.; C and D to Fort Ransom, D. T.; F and I to Fort Abercrombie, D. T.; and K to Fort Totten, D. T.

Companies A and G left Fort Snelling for Fort Ripley, April 29, 1869, but owing to the impassable condition of the roads or trails by which the companies designated to garrison Forts Abercrombie, Ransom and Wadsworth, were to reach their stations, their movement was delayed until May 14, when the six companies, B, C, D, F, H and I, under command of Captain H. G. Thomas, proceeded by rail to St. Cloud, Minn., and thence by marching to their posts.

Company K was detained at Fort Snelling until late in the month of May, when it proceeded by rail to Saint Cloud, Minn., and marched from that point to Fort Totten, a distance of 300 miles. About the same time Company A changed station from Fort Ripley to Fort Totten, by marching about 260 miles.

These stations were at that date among the most isolated and inaccessible in the country. They were located on, or near the reservations and lands on which the savage bands of Sioux roamed, or were maintained, and in addition to the probable restraining influence they had upon the Indians, served as safeguards to the thousands of hardy settlers who, with the advent of railways, have made the Dakotas the populous and prosperous States of to-day.

The headquarters of the regiment remained at Fort Snelling while the companies garrisoned these frontier posts, with occasional tours of detached duty and changes to and from regimental headquarters and other posts in the Department, performing duties incident to service in an Indian country. On August 31, 1871, Company B (Captain J. C. Bates) left Fort Wadsworth (since known as Sisseton and now abandoned), escorted a wagon train to

Fort Rice, D. T., and there joined an expedition commanded by Major Whistler, 22d Infantry, organized as an escort to a Northern Pacific surveying party, and as a part of this escort marched to the Yellowstone River. It returned to Fort Wadsworth, October 26, having marched 660 miles.

In 1872 and 1873 Company K was in the field for several months as an escort to the Northern Boundary Commission; and in the following year (1874), Company I was attached to and formed a part of the command of General Custer, for the exploration of the Black Hills country. Other companies had frequent but less extended tours of detached duty, on expeditions of minor importance.

The transfer of the regiment from the Department of Dakota to the Department of Texas was announced in General Orders from the Division of the Missouri, dated December 3, 1877. The movement commenced about the middle of the month, the companies marching to the nearest point at which railway transportation could be taken, and proceeding thence by battalions to stations assigned them in the Department of Texas as follows: Col. Sykes with headquarters, band and companies B, D, G, I and K, to Fort Brown, Texas; Co. A (Captain Patterson) to San Antonio, Texas; and Companies C, E, F and H, with Lieut.-Col. L. C. Hunt in command, were ordered to take station at Fort Clark, which was reached from the railway terminus (San Antonio) by a march of 126 miles.

This portion of the regiment, owing to the impassable condition of the roads from heavy rains during the last ten days of December, 1877, and early part of January, 1878, was detained in San Antonio from January 2 until the 21st, and did not reach Fort Clark, its station, until the 29th. The colonel, with headquarters, band and the companies assigned to Fort Brown (with the exception of Co. K), reached their station about January 1, 1878, Company K a few days later.

Companies C, E, F and H formed a part of the expeditions which on two occasions in 1878 crossed the Rio Grande in pursuit of cattle thieves; and, during the autumn of 1879 and winter of 1880, with a company of the 24th Infantry and the mounted company of Seminole Scouts, occupied the then Indian country south of Fort Davis and between the Rio Grande and Pecos Rivers, and opened a military road from San Philipe northwest across Devil's river, through Painted and Pecos Cañon, to a point near Maxon's Springs, materially shortening the wagon route from Clark to Fort Davis.

In 1880 some changes of stations of companies were made; Company A from San Antonio to Fort Brown, and Companies C, E, F and H, marching from Fort Clark to Fort McIntosh, and in February 1881, F and H, from McIntosh to Fort Ringgold.

The death of Colonel Sykes, who had held uninterrupted command of the regiment for more than twelve years, occurred at Fort Brown on the 8th of February, 1880. He was succeeded by Colonel Elwell S. Otis, promoted from Lieut.-Col. 22d Infantry, who joined at Fort Brown and assumed command of the regiment on the 31st day of March, 1880.

The transfer of the regiment from the Department of Texas to the Department of the Missouri was announced in General Orders from the Division of the Missouri of date October 16, 1881, and under Special Orders No.

XUM

133, Department of Texas, it moved as follows: Companies C and E left Fort McIntosh November 1, and having been assigned to station at Fort Dodge, Kansas, proceeded direct to that post by rail via San Antonio. On Nov. 5, the band, then temporarily at Fort Ringgold, with Companies F and H, left that post by steamboat, proceeded to Brownsville, thence to Point Isabel, where the six companies from Fort Brown had preceded them. The battalion,—then consisting of headquarters, band and Companies A, B, D, F, G, H, I and K, under command of Major C. R. Layton, 20th Infantry,—embarked on the evening of November 7 on board the steamer *I. C. Harris* which sailed on November 8, and arrived at Galveston on the 10th. From there they proceeded by rail to stations assigned them by S. O. No. 233, Department of Missouri, November 12, 1881, as follows: Headquarters, band and Companies F and H, Fort Leavenworth, Kansas; Company D, Fort Dodge, Kansas; Companies B and K, Fort Gibson, I. T.; Company A, Fort Wallace; and Companies B and I, and F, Fort Hays, Kansas. By the 15th of November all had reached their stations.

The regiment remained in this department (Missouri) until the spring of 1885, and all the companies, with the exception of B and K, had one or more change of station within the department. These companies were in the field during the troubles in the Indian Territory in March, April and May, 1883, when, under the command of Captain J. C. Bates, 20th Infantry, Brevet Lieutenant-Colonel, the capture of all insurgent Creek Indians was completed. The companies then returned to their station (Fort Gibson) having marched a distance of 375 miles. In January and February, 1885, Companies C and D (which had, on the abandonment of Fort Dodge in June, 1882, changed station to Fort Reno, I. T.) were in the field engaged in removing intruders and trespassers from the public lands in Oklahoma, and in the performance of this duty marched 188 miles. No other field service of importance was performed by companies of the regiment in the department of the Missouri.

In compliance with G. O. No. 44, A. G. O., April 9, 1885, and G. O. No. 2, Headquarters Division of the Missouri, April 29, 1885, the regiment was again transferred to the Department of Dakota, and on May 20, the entire regiment having rendezvoused at Fort Leavenworth, Kansas, proceeded by rail to Bismarck, D. T., where it arrived on May 23, and on the same day embarked on steamers *Helena*, *Batchelor* and *Rosebud*, for the upper Missouri country. The headquarters, band, and Companies A, B, C, E, F, H, I and K, took post at Fort Assiniboine, Mont., which, after disembarking at Coal Banks, was reached by a march of 40 miles. Companies D and G, under command of the major (Bates) disembarked at Rocky Point and marching about fifty miles, reached Fort Maginnis, to which post they had been assigned, thus relieving at these posts the entire Eighteenth Infantry, which was transferred to the Department of the Missouri, using in its journey to Bismarck the boats by which the Twentieth Infantry had made the trip up the Missouri River. By the 10th of June, 1885, the headquarters and companies were at their stations.

In October, 1885, Company I marched from Fort Assiniboine to Sweet Grass Hills and returned to post. Distance marched, 144 miles. Company

D, as escort to paymaster, marched from Fort Maginnis to Custer Station, and returned to its post on the 16th of November, 1885, having marched 220 miles. In August, 1886, Company G changed station from Fort Maginnis to Camp Poplar River, Mont., by marching about fifty miles to the Missouri River (Rocky Point), thence by boat; and in the same month, Company I changed station from Fort Assiniboine to Camp Poplar River, marching to Claggett (60 miles), thence by boat to its station. During the months of October and November, 1886, short tours of detached duty were performed within thirty or forty miles of the post by Companies A, C and K. Company B, Captain McCaskey commanding, left Fort Assiniboine May 27, 1887, and marched to Sweet-Grass Hills, where it remained in camp until October, returning to its post on the 17th of that month, having marched 140 miles. Companies E and H performed short tours of detached service in the months of August and September, 1887. In the spring of 1888 Companies A, F and K performed a tour of twenty days detached duty, and commenced the construction of a dam on Beaver Creek, about eight miles above the post, for the storage of water from which the post might be supplied in seasons of excessive drought. On June 1, Company A left Fort Assiniboine for Fort Maginnis, changing station, and marched 126 miles. Company D left Maginnis on the same date for Fort Assiniboine, where it arrived and took station June 8, having also marched 126 miles.

In September, 1888, a practice march of 73 miles with camps of instruction lasting 23 days was participated in by the band, Companies B, C, D, E, F, H and K, from Fort Assiniboine, and similar instruction was given companies of the regiment stationed at other posts. This was repeated in the fall seasons of 1889–90–91 and 92, throughout the Department, under orders from its commander.

During the fall of 1888 and summer of 1889, all the companies of the regiment performed short tours of detached service. On the 16th of October, 1889, Company F changed station from Fort Assiniboine to Camp Poplar River, Montana; and Company G, on the 17th, left Camp Poplar River for Fort Assiniboine, taking station there October 18, both movements by rail. Company A changed station from Fort Maginnis to Assiniboine, and, under the same order, Company C moved from Fort Assiniboine to Fort Buford, North Dakota. Company A reached Fort Assiniboine May 28, 1890, having marched 118 miles, and Company C arrived at Buford the same date, by rail 295 miles.

Companies I and K were skeletonized under General Orders No. 76, A. G. O. series of 1890, the officers transferred to other companies from which officers were absent on extended tours of detached service, or long leave of absence, and the enlisted men distributed among the remaining companies of the regiment. By the disbandment of Company I at Camp Poplar River, that garrison was reduced to one company, and on the 18th of September Company C, under orders of the Department commander, left Fort Buford and marched to Camp Poplar River, 63 miles, taking station there September 21, 1890.

On November 29, 1890, Companies G and H, under command of Captain

A. A. Harbach, 20th Infantry, left Fort Assiniboine en route by rail to Fort Keogh, Mont., equipped for participation in the campaign then being inaugurated against unruly Sioux Indians.

The battalion reached Fort Keogh on December 2, went into camp near that post, and remained until December 31, when it was attached to the command of Colonel A. K. Arnold, 1st Cavalry, and on that date marched with it en route to the Little Missouri River, which was reached on January 9, 1891, and a camp established from which the country could be patrolled. This was maintained until the 22d of January, when, under orders from the Department commander, camp was broken and the command returned to Fort Keogh, where it arrived on the 29th and remained until the 3d of February, 1891, when the battalion returned by rail to Fort Assiniboine, Montana, having travelled 1188 miles by rail, and marched 268 miles.

In the summer following, Company I was reëstablished, as an Indian company, under War Department Orders of March 9, 1891, and assigned to station at Camp Poplar River. Enlistments of Indians for this company were made from the Sioux at the Poplar River, and Gros Ventres and Assiniboines at the Fort Belknap Agency, and, when the number necessary for its organization seemed assured Company F was ordered from Camp Poplar River to Fort Buford, and, proceeding by rail, took station there May 21, 1891. A few weeks later, it again changed station to Fort Assiniboine, where it arrived by rail on the 21st of July, 1891. Since that date no changes have taken place, nor have any tours of detached service been performed by companies beyond the usual fall manœuvres in September of 1891 and 1892. The regiment is now,—March, 1893,—stationed in the Department of Dakota, the Headquarters, Band, and Companies A, B, D, F, F, G and H, at Fort Assiniboine, Montana, commanded by Lieut.-Colonel Evan Miles, 20th Infantry. Companies C and I at Camp Poplar River, Mont., commanded by Major Lloyd Wheaton, 20th Infantry.

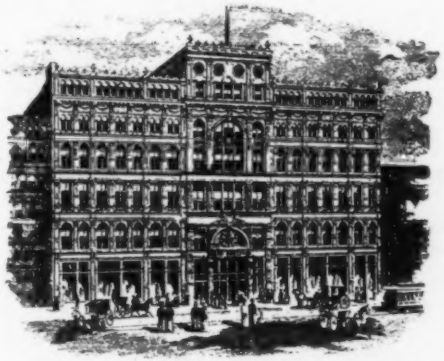
THE BATTLE OF HEALTH

Is never fought out while we live, but it is an easier fight when our bodies receive proper nourishment. If the body is defended with

SCOTT'S EMULSION

of Cod-liver Oil, with hypophosphites of lime and soda, it will always be in good shape to withstand the attacks of disease. Scott's Emulsion builds up strength and flesh. It strengthens weak lungs and overcomes coughs and colds. It is especially adapted to all wasting diseases. *Physicians*, the world over, endorse it.

Prepared by SCOTT & BOWNE, N. Y. **DRUGGISTS SELL IT.**



STERN BROTHERS,

32, 34, 36, 38, 40, 42, 44 & 46 WEST 23d STREET,
23, 25, 27, 29, 31, 33 & 35 W. 22d ST., NEW YORK.

IMPORTERS AND RETAILERS OF

DRY GOODS

Fall and Winter Illustrated Catalogue now ready;
will be mailed free on application.

THE OLD STANDARD OF THE ARMY.

LORILLARD'S

CLIMAX

PLUG TOBACCO.

Always Uniform. Always the Finest.

THE

NEW ARMY FAVORITE.

Lorillard's

'49

Cut Plug

SMOKING TOBACCO.

ARE THE BEST.

CIGARETTE SMOKERS who are willing to pay a little more than the price charged for the ordinary trade Cigarettes, will find **THIS BRAND** superior to all others.

The Richmond Straight Cut No. 1

CIGARETTES

are made from the brightest, most delicate in flavor, and highest cost **GOLD LEAF** grown in Virginia.

BEWARE OF IMITATIONS, and observe that the name of the manufacturers as below is on every package.

THE ALLEN & GINTER BRANCH, THE AMERICAN TOBACCO CO, RICHMOND VIRGINIA

PIPE SMOKERS

SHOULD TRY

ALLEN & GINTER'S

Imperial Smoking Mixture.

"CUBE CUT."

A delightful blend of choice selections of Turkish, Perique and Havana tobaccos with bright Virginia, prepared by an entirely new and original process, combining all the advantages of cut tobaccos with the peculiar qualities of granulated goods.....Smokes cool and sweet, and lasts as long in the pipe as cut plug. It is absolutely free of stems.

BEST&CO

To Clothe Boys & Girls

Neatly, stylishly and at the same time economically is the desire of most parents. Is it unreasonable to claim that where the outfitting of young people is made the sole business of a large store, that it means advantages which no other store can offer in wide range of choice, fit and price?

Good illustrations are our

Boys' all wool suits $3.00 to $6.00.
Girls' School Dresses $1.00 to $10.00.

60-62 West 23d St., N. Y.

Scientific American Agency for

PATENTS

CAVEATS, TRADE MARKS, DESIGN PATENTS COPYRIGHTS, etc.

For information and free Handbook write to MUNN & CO., 361 BROADWAY, NEW YORK. Oldest bureau for securing patents in America. Every patent taken out by us is brought before the public by a notice given free of charge in the

Scientific American

Largest circulation of any scientific paper in the world. Splendidly illustrated. No intelligent man should be without it. Weekly, $3.00 a year; $1.50 six months. Address MUNN & CO., PUBLISHERS, 361 Broadway, New York.

BLACKWELL'S

"Bull Durham" and

GRANULATED

"Royal Cat's Eye"

PLUG CUT

TOBACCOS

are the most honest, popular, uniform, reliable, satisfactory goods ever put upon the market. To smokers of granulated tobacco

"BULL DURHAM"

needs no commendation, it having been known to the officers and soldiers of the United States Army for the past 20 years.

To smokers of Plug Cut goods we are offering our

"ROYAL CAT'S EYE,"

a recent production, in the manufacture of which we have spared neither pains nor money to combine in it those qualities that insure a mild and delicious smoke.

One Post Commissary writes of "ROYAL CAT'S EYE," "The tobacco sent is of excellent quality and gives entire satisfaction."

Another writes, "It gives satisfaction."

Another writes, "It meets general approval as to its quality and fragrance."

NEW YORK. CHICAGO.

Aquila Rich Paint & Color Co.

MANUFACTURERS AND IMPORTERS OF

DRY COLORS, PAINTS IN OIL AND JAPAN,

VARNISHES, ETC.

CROCKETT'S SPAR VARNISH. CROCKETT'S WOOD PRESERVATIVES.

These Varnishes will stand the wear of any climate for either vessels or houses.

Winsor & Newton's, (Lim.) London, Artists' Colors and Materials.

THE STANDARD QUALITY OF THE WORLD.

NEW YORK OFFICE: 84 William Street.

CHICAGO OFFICE: 257 Dearborn Street.

G. W. DUNBAR'S SONS,

NEW ORLEANS, LA.

—Preservers and Packers of—

FRESH SHRIMP, For Salads and Mayonnaise.

GREEN TURTLE, For Soup.

FRESH OKRA, For Soup.

OKRA GUMBO, Ready for the Table.

ARTICHOKES, For Entrées.

PRESERVED FIGS, For the Tea Table.

ORANGE PRESERVE, For Dessert.

LOUISIANA GUMBO FILÉ.

CREOLE PEPPER SAUCE.

SUGAR CANE SYRUP. For Table Use.

SOLD BY ALL GROCERS THROUGHOUT THE U. S.

KEMP, DAY & CO.,

PACKERS OF AND DEALERS IN

CANNED GOODS, JELLIES, PICKLES, PRESERVES, Etc.

116 WALL ST. and 73 HUDSON ST., NEW YORK.

JOHN H. KEMP.
EDWIN SHERMAN.
SIDNEY THURSBY.

OUR SPECIAL BRANDS,
THE "BELL," "SILVER SPRAY,"
"GOLDEN ROD," AND "MOHAWK,"
CORN, PEAS, TOMATOES, &c., &c.

(Particular attention paid to orders from the Army and Navy.)

XUM

OLD BELLE OF NELSON Rye or Bourbon Whiskey.

DISTILLED FOR THE FINEST TRADE.
GUARANTEED ABSOLUTELY PURE.

And to be Hand-Made Sour Mash of the Finest Quality.

For Sale in Cases containing 12 Bottles,
15 Years Old,

$15.00 PER CASE.

Or by the Gallon at $4 and $5 according to age.

Goods shipped to any address, and if not found to be as represented can be returned at our expense. Each case contains two gallons. We have depots North, East, South and West, where orders will be filled from, thus saving express charges. If this is not satisfactory then address the

BELLE OF NELSON DISTILLERY CO.

Special prices to members of U. S. A. 123 & 125 E. Main St., Louisville, Ky.

MANUFACTURERS OF UNIFORMS OF THE HIGHEST CLASS
Style Fit Durability

THE HENDERSON-AMES CO.

Equipments of Every Description.
U. S. Regulations a Specialty.

KALAMAZOO, MICH.

Arnold, Constable & Co.

FALL UNDERWEAR.

CARTWRIGHT & WARNER'S

Ladies' and Children's Underwear.

MEN'S UNDERWEAR

Natural Wool, Merino and Silk and Wool Underwear.

HOSIERY.

Ladies' and Children's Fall and Winter Weights,

MERINO, CASHMERE, SILK AND BALBRIGGAN

HOSE.

Gentlemen's Half Hose, Gentlemen's Bicycle Hose,

PLAIN COLORS AND HEATHER MIXED.

Broadway and 19th Street, New York.

WORLD'S FAIR! HOTEL DELAWARE,

CHICAGO,

Corner Cottage Grove Ave. and 64th Street.

Accommodations Secured in Advance. First-Class "European."

"ONLY FIVE MINUTES FROM WORLD'S FAIR."

RESPECTFULLY SOLICITS ARMY AND NAVY PATRONAGE.

Rates Moderate. SEND FOR CIRCULAR. WM. N. PELOUZE, PROPRIETOR.

ESTABLISHED 1842.

A STRICTLY PURE LARD, SELECTED FROM THE FINEST STOCK.

NAPHEYS' "GOLD BRAND" PURE LEAF LARD

GEO. C. NAPHEYS & SON, LARD REFINERS, 310-320 SPRUCE ST., PHILA.

XUM

DANIEL'S All Forged Genuine Steel Bits.

Registered in
GREAT BRITAIN
and in the
UNITED STATES.

TRADE D MARK

SAFE. RELIABLE.

EXTRA FINE FINISH.

UNSURPASSED FOR WEAR.

13,356. Sliding Port.

13,335. 4-Ring Chin Loop.

Over 1,000,000 Daniel Bits have been sold. Forged Mouth Piece and Cheek Piece made from same fine quality and material as has been used in their manufacture for over 70 years. **W. Brodhurst & Co., Makers.** Bits forged to specifications.

For sale by all Harness Houses or by

P. HAYDEN, Newark, N. J.

Send for Special List.

STYLE No 6.

GULDEN'S

Fine Prepared Mustard.

WARRANTED ABSOLUTELY PURE.

A TRIAL WILL CONVINCE YOU THAT IT IS THE BEST.

CHARLES GULDEN, Manufacturer,
NEW YORK.

COWDREY'S SOUPS

Are skilfully blended from the best materials into flavors that always delight though they vary with the kind of soup.

COWDREY'S DEVILED HAM

Is a most delicate preparation from sugar-cured whole hams and the purest of spices. As a meat sandwich is frequently the chief item of a luncheon a more convenient and useful article could hardly be offered than a package of Cowdrey's Deviled Ham. It may be served in a pleasing variety of ways, for breakfasts, lunches and teas.

Send postage stamp for Tidbit Receipts to

E. T. COWDREY CO. **Boston, Mass.**

PASTEUR GERM-PROOF WATER FILTERS.

I have tested the Pasteur-Chamberland Filter by bacteriological methods, and find it to be germ-proof. I believe it to be the most reliable filter for the removal of disease germs from drinking water which has been invented.—GEO. M. STERNBERG, Maj. and Surg., U. S. A.

The "Tourist" style will be found a valuable acquisition to the campaign outfit for every officer of the Army and Navy.

MR. F. G. HODGSON, 1st Lieut. 6th Cavalry, U.S.A., writes from Fort Leavenworth, Kansas, "The Tourist Filter should be in the 'outfit' of every officer in the Army."

Write us for catalogue and prices. Discounts to dealers only.

The Pasteur Filter Supplies the Free Drinking Water Stations on the World's Fair Grounds.

The Pasteur-Chamberland Filter Co.
DAYTON, OHIO, U. S. A.,
Sole Licensee for the United States, Canada and Mexico.

R. C. ANDERSON, Manager, Eastern Department,
No. 4 West 28th Street, New York City.

THE PRATT & WHITNEY CO.

MANUFACTURERS OF

Gun- and Sewing-Machine Machinery,

MACHINE TOOLS of all kinds for use in Machine Shops and by Railroads—Gauges, Taps, Dies and Reamers. U. S. Standard Taps and Dies a specialty.

SEWING-MACHINE AND GUN MANUFACTURERS

fitted out with approved plants for producing finished goods, including all necessary Machinery, Tools, Fixtures, Gauges, etc.

We have made recent improvements in Gun Barrel Drilling Machines which reduces the cost of finishing the inside of the barrel at least one half. Nearly all the straightening and the bad effect of hammering is avoided. We refer to National Armory, Springfield, Mass.; also Davenport Fire Arms Co.; Hopkins & Allen M'f'g. Co., Norwich Conn.

We also manufacture the celebrated

PRATT & WHITNEY IMPROVED GARDNER MACHINE GUN,

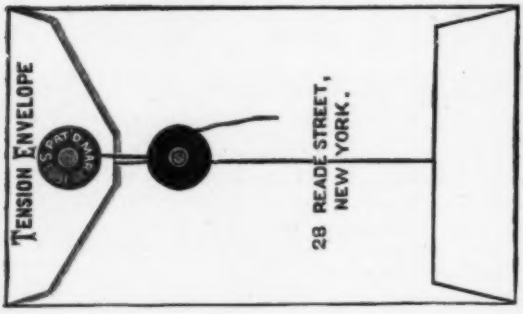
which has a firing capacity with two barrels of FIVE HUNDRED SHOTS PER MINUTE, and with four barrels ONE THOUSAND SHOTS PER MINUTE; mounted on tripod or carriage. We would call the attention of MILITARY men to this GUN, to whom we shall be pleased to furnish further information on application. Its extreme SIMPLICITY, DURABILITY, and STRENGTH, should recommend it above all others. Circulars, Illustrated Catalogues, and Price-lists sent upon application to

THE PRATT & WHITNEY CO.,

Hartford, Conn., U. S. A.

THE TENSION ENVELOPE CO.

28 READE STREET, NEW YORK.



We call attention to our Patent Tension Envelopes, manufactured for mailing Samples of Dry Goods, Carpets, Silks, Trimmings, Photographs, Catalogues, and all merchandise of third and fourth-class matter.

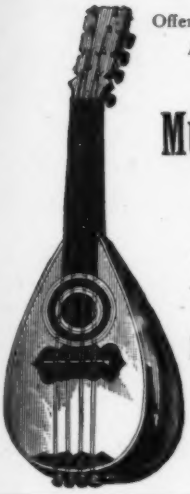
They are used by all the leading firms in the country, and the Postal authorities say:

"They are simple and secure, easily opened for examination and easily closed."

Samples, with Price and size List, mailed on application. Special sizes made to order, and estimates given on same.

The RUDOLPH WURLITZER CO.

CINCINNATI, O.



Offer to the Officers and Men of the U. S. Army and Navy special discounts and prices on

Musical Instruments

AND

STRINGS

OF EVERY DESCRIPTION.

BAND AND ORCHESTRA MUSIC.

PIANOS AND ORGANS.

Catalogues furnished on application.

COLUMBIAN UNIVERSITY. CORCORAN SCIENTIFIC SCHOOL.

DEPARTMENT OF CHEMISTRY.

Courses in general chemistry, qualitative and quantitative analysis are now open.

Instruction will be given in wet and dry assaying. The department is unusually well equipped for this work.

Instruction in modern methods of iron and steel analysis will be given as a special course to properly qualified students.

Special instruction in the chemistry of explosive substances is offered to officers of the Army, Navy, and militia.

Particular attention will be given to providing facilities for research work for post graduate students who are candidates for the degrees of master or doctor in science or philosophy.

CHARLES E. MUNROE, Professor of Chemistry.

BOB'S STOCKING.

Susan and Mary, and dear little Rod,
All hung up their stockings, but greedy Bob,
Who was always hungry and dirty, too,
Thought he had a much better plan in view;
The rest went to bed, he lingered behind
With the largest stocking he could find,
And laughed with glee as he thought of the lot
Of things he would get by means of his plot.

When Christmas morn dawned, the children all ran
To the chimney-piece their treasures to scan.
A doll was for Mary, another for Sue,
And in Rod's stocking a horn hung in view,
While all of the three that hung in a row
Were stuffed full of candies from top to toe,
But greedy Bob's held to its utmost scope
Nothing but cakes of pure Ivory Soap.

Santa supposed it was for Bob's mother,
And knew she preferred this soap to all other.

G. 23. COPYRIGHT 1893, BY THE PROCTER & GAMBLE CO.

XUM

XUM

CARPETINGS.

All Grades and Styles are shown in our stock in such variety that satisfactory designs and colorings can always be secured.
We solicit particular attention to our large display of

FOREIGN & DOMESTIC RUGS & MATS

in all sizes, and the

SLOANE CENTRAL CARPET

especially desirable when it is not intended to cover the entire floor.

UPHOLSTERY GOODS and LACE CURTAINS.

The great variety shown in these Departments affords unusual opportunities for securing rich and artistic decorative effects; it also includes an extensive line of simple and inexpensive fabrics in the latest high art designs.

Samples and suggestions by mail. Mail orders have our prompt attention.

W. & J. SLOANE, BROADWAY, 18th & 19th Sts., NEW YORK.

New York, 148 Fifth Ave. **Wm. Knabe & Co.** Washington, 817 Penn. Ave.

Baltimore, 22 and 24 East Baltimore Street.

GRAND UPRIGHT—**PIANOS**—AND SQUARE.

VON BÜLOW'S LETTER,
After Concert Tour, 1890.

To WM. KNABE, Esq.,
Baltimore.
Dear Sir:

My renewed and by more use—under aggravating circumstances, as bad health and tiresome travelling—enlarged experience of your Pianos this (second and last transatlantic) season has throughout confirmed myself in the opinion I expressed last year, viz.: That sound and touch of the Knabe Pianos are more sympathetic to my ears and hands than sound and touch of any other Pianos in the United States. *As I met with frequent opportunities of establishing comparisons between the Knabe Pianos and Instruments of rivalizing or would-rivalizing producers, I dare now add that I declare them* the absolutely best in America.

With sincere regards,
Yours truly,
DR. HANS VON BÜLOW.
Hamburg, 27th May, 1890.

Letters from the World's Greatest Pianists:

Von Bülow

—AND—

D'Albert

Both declare the Knabe the Best Pianos in America.

Eugen D'Albert's Letter
—TO—
WM. KNABE & CO.

Translated from the German.

During my sojourn here I had frequent opportunities to make myself acquainted with the Knabe Pianos, and from fullest conviction I declare them to be the best instruments of America. *Should I return here for artistic purposes—which may be the case very soon—I shall most certainly use the Pianos of this celebrated make. I give this testimonial with pleasure, voluntarily, and entirely* unsolicited *for by the house of Knabe.*

EUGEN D'ALBERT.
New York, May 16, 1890.

Highest of all in leavening strength.
Latest U. S. Gov't Food Report.

In all receipts for cooking requiring a baking powder the ROYAL, because it is an absolutely pure cream of tartar powder and of 33 per cent. greater leavening strength than other powders, will give the best results. It will make the food lighter, sweeter, of finer flavor and more wholesome.

I regard the Royal Baking Powder as the best manufactured.
Marion Harland.

I have found Royal Baking Powder superior to all others.
C. Gorju,
Late Chef de Cuisine, Delmonico's, N. Y.

XUM